

APRIL, 1961

ARMED FORCES

Management

PUBLISHED FOR THE MILITARY SERVICES OF THE FREE WORLD



RADM Lloyd Mustin

Exclusive Progress Report On ASW...14



1 kw Hughes traveling wave tubes in S-Band

Now available in production quantities, these new and improved tubes offer you 1 kw of pulsed output power, with low power input, minimum heat generation and high reliability.

All these Hughes S-band tubes are lightweight, compact and ruggedly built to withstand the most severe environmental conditions—and provide long life. Each has been fully tested in the field.

Three of these tubes provide full octave frequency ranges of 2.0 to 4.0 kmc and you have a choice of either 1/2 or 1% duty, in either ungridded or gridded versions, and with gains up to 37 db. All are permanent magnet periodically focused.



311H Gridded, 1 kw minimum peak power output, 1% duty, 36 db small signal gain @ 50 mw input. Weight: 13 lbs. Length: 17-7/16". Meets usual customer requirements of MIL-E-5400, Class I environmental tests.



312H Gridded 1 kw minimum peak power output, 1/2% duty, 36 db small signal gain @ 50 mw input. Weight: 11 lbs. Length: 15-3/8". Meets usual customer requirements of MIL-E-5400, Class I environmental tests.



304H Ungridded, 1 kw minimum peak power output, 1% duty, 37 db small signal gain @ 1 mw input. Weight: 12 1/4 lbs. Length: 17-31/32". Meets usual customer requirements of MIL-E-5400, Class I environmental tests.



313H Ungridded, 1 kw minimum peak power output over the center portion of the band, 1/2% duty, 36 db small signal gain @ 1 mw input. Weight: 17 1/2 lbs. Length: 16-5/8". Meets usual customer requirements of MIL-E-1 environmental tests.

For information wire or write:
11105 Anza Ave.
Los Angeles 45, Calif.

CREATING A NEW WORLD WITH ELECTRONICS

HUGHES

HUGHES AIRCRAFT COMPANY
MICROWAVE TUBE DIVISION



How

WI
TC

Instal
imagi
moon
tanks

How science serves Defense at Westinghouse

WESTINGHOUSE IMAGING SYSTEM ENABLES PILOTS TO SEE HOSTILE GROUND TARGETS ON DARK NIGHTS



Installed in combat aircraft or missiles, the new Westinghouse low-light level imaging system clearly pictures tactical targets normally obscured on cloudy, moonless nights. The system is equally effective for target-viewing systems in tanks or submarines.

Military pilots can see moving ground targets and terrain features at night, instantly, with a new low-light level electronic imaging system being developed at Westinghouse.

The new system will see hundreds of times better than the human eye under darkest night conditions. It is simple, compact, and rugged, utilizing advanced versions of the small Astracon light amplifying tube, a product of Westinghouse research. Systems using this tube will automatically track-while-scan, and simultaneously present a full field of view.

Westinghouse, at its Air Arm Division in Baltimore, is also applying results of its years of research in electronic imaging sensors to infrared and ultraviolet systems, planned for space programs.

The new imaging systems, coupled with traditional Air Arm capabilities in fire control, reconnaissance, surveillance, and missile guidance, offer potent new levels of military strength for the free world . . . They are another demonstration of how science is serving Defense at



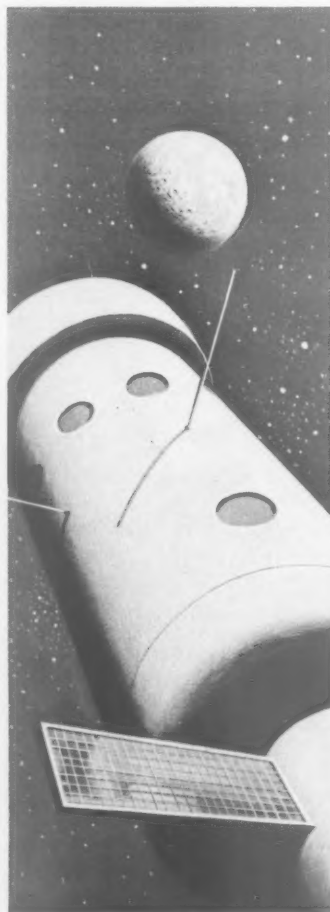
Westinghouse



Advanced Westinghouse thermal imaging systems for space applications permit accurate detection and tracking of ballistic missiles, satellites, or spaceships. These systems feature high scan speeds, high resolution, and inherent reliability. Low power consumption means weight and space savings.



Weather mapping the world is but one of the many jobs which can be performed with advanced Westinghouse infrared systems.



Westinghouse Uvicon ultraviolet imaging system will enable man to see a UV picture of the universe, taken from above the atmosphere.

Infrared, Ultraviolet imaging systems being developed for new space missions

Advanced imaging systems utilizing infrared and ultraviolet spectra are being developed at Westinghouse for a variety of military and scientific uses.

At the Air Arm Division in Baltimore, active and passive thermal imaging systems are being planned around advanced infrared devices, including the Westinghouse Space Thermicon. Missions include target detection, tracking and guidance, reconnaissance, surveillance, and mapping. A key factor in these systems is the successful application of ultrathin infrared-sensitive membranes developed by Westinghouse scientists.

Westinghouse has also developed the Uvicon imaging tube, sensitive to shortwave ultraviolet rays such as those emitted by celestial bodies but which are absorbed by our atmosphere. In space vehicles, systems using Uvicon will give man a new view of the universe.

These new IR and UV imaging systems, plus unparalleled advances in visible light systems, offer America potent new military and scientific capabilities. They are another demonstration of how science is serving Defense at



Westinghouse

C. W. Borl

Paul A. Conl
James Lewis
William H.
David Ross R
John Walen
Floyd G. Arp

Elsie Gray
Carolyn Dalie
Eugene White
George Peter
Richard Gibs
Donald E. Fu

Regional

New York 17
Ray Quirk
Beverly Hills
James Cla
Blvd., OLea
Chicago 2, I
Lenn Frank
6-6804
Detroit 2, MI
Ken Wells
5-2555
Geneva, Swi
Anthony Va
Granus, PI
GENEVA
London W.1,
Frank V. N
St., GRowe
Dallas, Tex.
202 Wynne
hall 3-4266
Miami, Flori
208 Almeri
Paris, France
Jean-Marie
15-39

Published
Publications,
Washington
3-5400.

Wayne W. F
Leonard Else
Fred S. Hunt

Unsolicited
panied by a
envelope. An
not assume
any unsolici

Published
Publications,
at The Tel
Accepted as
tion at Harri
Copyright 19
cations, Inc.
notice before
for change
\$10.00 a ye
overseas, sin



C. W. Borklund Publisher

Paul A. Conlin Managing Editor
James Lewis Editorial Assistant
William H. Martin Art Director
David Ross Robertson Asst. Art Director
John Walen Production Manager
Floyd G. Arpan Editorial Consultant

★

Business Staff

Elsie Gray Advertising Service Manager
Carolyn DellaValle Production Assistant
Eugene White Circulation Manager
George Peterson Cir. Fulfillment Mgr.
Richard Gibson Marketing Director
Donald E. Fullam Asst. Marketing Dir.

★

Regional Advertising Offices

New York 17, New York
Ray Quirk, 20 East 46th St., YUkon 6-3900
Beverly Hills, Calif.

James Clear, Edwin Denker, 8929 Wilshire
Blvd., OLeander 5-9161

Chicago 2, Ill.
Lenn Franke, 139 N. Clark St., CEntal
6-6804

Detroit 2, Mich.
Ken Wells, 412 Fisher Building, TRinity
5-2555

Geneva, Switzerland
Anthony Vandyk, European Director, 10 Rue
Grenus, Phone 321044, Cable AMERAY
GENEVA

London W.1, England
Frank V. Norall, Norall & Hart, 28 Bruton
St., GRowenor 8356

Dallas, Tex.
202 Wynnewood Professional Bldg., WHite-
hall 3-4266

Miami, Florida
208 Almeria Avenue, HIGHLand 4-8326

Paris, France
Jean-Marie Riche, 11 Rue Condorcet, TRU
15-39

★

Published monthly by American Aviation
Publications, Inc., 1001 Vermont Ave., N.W.,
Washington 5, D.C. Telephone: STerling
3-5400.

Wayne W. Parrish President
Leonard Eislerer Vice Pres. and Gen. Mgr.
Fred S. Hunter Vice Pres., Editorial Dir.

★

Unsolicited manuscripts should be accom-
panied by a stamped, self-addressed return
envelope. Armed Forces Management does
not assume responsibility for the return of
any unsolicited material.

★

Published monthly by American Aviation
Publications, Inc., Washington, D.C. Printed
at The Telegraph Press, Harrisburg, Pa.
Accepted as controlled circulation publica-
tion at Harrisburg, Pa. and Washington, D.C.
Copyright 1961 by American Aviation Publi-
cations, Inc. Reg. U.S. Pat. Off. Four weeks'
notice before next publication date required
for change of address. Subscription Price:
\$10.00 a year in U.S. and Canada, \$15.00
overseas, single copy price \$1.00.



ASW's Unsolved Problem

EDITORIAL

ELSEWHERE IN THIS ISSUE are both viewpoints (industry's and Navy's) on an anti-submarine warfare problem which has been banging the nose of progress for almost two years.

Ever since AFM zeroed in on this lag in Navy-industry team effectiveness, we have been engaged in an almost constant evaluation of the merits of industry's complaints, the legitimacy of Navy's rebuttal.

Our conclusion: Not all the team members, by any means, are getting the word. As a result, not all the available resources—men, money, material—nor even 90% of them are being utilized. We feel it is well past time for this snarl in communications to be straightened out. And we suggest that National Security Industrial Association's ASW Committee is the group to launch an unravelling.

NSIA sits right astride the communication channel between industry and Navy. NSIA is in the best position by far to (1) find out where this apparent lack of understanding is welling up and (2) see that something is done about it.

There is another reason for nominating NSIA: individual firms cannot be expected to launch individual crusades when the object is telling their only customer he's confused. Nor should they be expected to. Results, at best, would be indecisive.

Navy's conclusion from all the ASW complaints that have appeared on these pages is that (1) either changes *are* needed or (2) people are not properly informed, "don't know what we're doing and, specifically, are unaware of the proper mechanics and procedures for reaching Navy with ideas." And Navy obviously is not going to make any major alterations until the validity or falsity of point two is established.

Certain of the complaints, of course, can be discounted as the gripes of firms disappointed in not receiving contracts. But this is by no means a legitimate reason for discounting the *entire* thesis presented here by industry. Most industry people in ASW can prove a claim of conscientious devotion to national duty just as easily as can their Navy counterparts.

One suggestion as a starter: How good are the channels used by industry's scientists and engineers (on the ASW committee) to spread the word within their individual organizations. We propose this because Navy discounts these "industry arguments" as coming not from the technologists on the committee ("who know the situation") but primarily from marketing and sales people ("who don't"). Many of the criticisms, but by no means all of them, are from this area. And even if they *all* were, these people presumably perform a valuable function. (If they don't, obviously, they should be fired.)

Case in point: the contrast in management communications between ASW and the Special Projects Office. In the latter, everyone had a clear understanding of what everyone else was, or should be, doing. They left no room for the reputed penchant of some engineers to carry information and ideas around, never telling anyone—including people within their own organization—just what they have in mind.

As Raborn insisted to all his technical people: "if you can't write it down on paper, you don't know what you're talking about and/or we can't do anything about it." We should add that SP's success in communications is the key reason we have long felt the office, or at least its techniques, should be adopted by at least the R&D portion of the ASW effort.

Bill Borklund



Comprehensive Customer Service Program



...backs up every PHILCO 2000 Data Processing System

In purchasing or leasing a Philco 2000 Data Processing System, you are acquiring the ultimate in computer capabilities. Great speed, accuracy, capacity, reliability and flexibility are built into every Philco 2000. But, to realize the full benefits of these inherent advantages, the system must "mesh" perfectly with your own individual needs and objectives. This is the purpose of Philco's extensive customer service program—which starts long *before* the sale and continues long *after*.

This program embraces every possible customer aid... management seminars, systems analysis, programming, training and maintenance. In scope and depth, these Philco services are unsurpassed in the entire industry. They back up every Philco 2000, assuring you the best of results from the best of computers. Write for complete information on what Philco has to offer you... in both systems and services.

Philco services are tailored to meet your individual requirements

PHILCO

 Famous for Quality the World Over

MANAGEMENT SEMINARS. Continuing series to explain uses and potential advantages of Electronic Data Processing in specific applications.

SYSTEMS ANALYSIS. Thorough study of your data processing needs and system recommendations to meet them.

PROGRAMMING. Skilled programming assistance at your site... plus wide variety of Philco automatic programming systems and complete library of routines.

CUSTOMER TRAINING. Comprehensive courses to train your personnel in *all* phases of computer operations.

INSTALLATION and MAINTENANCE. Complete service provided by Philco engineers... or training for your own engineers.

PUBLICATIONS. Comprehensive manuals for training and programming, plus frequent bulletins on new developments.

PHILCO CORPORATION • GOVERNMENT & INDUSTRIAL GROUP • COMPUTER DIVISION, 3900 WELSH ROAD, WILLOW GROVE, PA

ARMED FORCES

Management

PUBLISHED FOR THE MILITARY SERVICES OF THE FREE WORLD

APRIL, 1961

Volume 7—No. 7

FEATURES

Pentagon Profile—This Month: Rear Admiral Lloyd M. Mustin 19



The Navy's Anti-Submarine Warfare Readiness Executive takes issue with critics who feel his program is inadequate. Admiral Mustin speaks with almost two decades of ASW authority. He points to technical advances by the Navy in ASW which cannot be matched by any other world power and anticipates other solutions to whatever new difficulties develop.

What Industry Thinks of the ASW Problem 14

Industry has reservations on whether sufficient progress is being made in solving the problem of Anti-Submarine Warfare. This is evident in the comments prepared by industry in answer to queries by AFM on the subject. The Navy concedes that if a problem exists it is the requirement to keep ahead of the capabilities of potential enemies. This program will cost money increasingly and the Navy intends to request enough funds to do the job.

Can Defense Balance Costs of Maintenance 20

Management specialists for the military services and the Defense Department spell out the scope of the maintenance problem in billion dollar terms and explain the methods they are using to lick it.

Civil Service Goal: Stronger Management Program 28

The new Chairman of the Civil Service Commission, John W. Macy Jr., has definitive plans for bolstering the system. He lists them in this presentation made at the recent Armed Forces Management Association conference.

New Defense Team 33

Numerous changes have been made in the Pentagon's administrative roster. These background sketches of the newcomers are followed by an organization chart.

Programmer to Bridge Defense Plans Gap 46

Charles J. Hitch, the new Defense Comptroller, informed the AFMA conference in this speech that a planning gap exists. He intends to bridge it by better Pentagon programming.

Conference Quotes 60

During its three-day conference last month, the AFMA "picked" the best brains in the business. These are excerpts from most of the presentations.

DEPARTMENTS

Editorial	5	Research Rundown	39	Association News	56
Washington Background	11	Procurement Trends	44	Advertisers' Index	62
		In My Opinion	55		

NEXT MONTH:

Report on Small Business . . . Government Procurement Critique . . . Career Civil Service Program . . .



AN ACHIEVEMENT IN DEFENSE ELECTRONICS



4
I
a
d
th
C
tr
d
b
d
m



412L Strengthens Air Defense By Integrating Airspace Management

Rapid coordination of all phases of military airspace management is a major problem of air defense. This simulated operations room depicts the heart of the Air Force's 412L Air Weapons Control System—a single, semi-automatic electronic complex which coordinates radar stations, data processing and display centers and weapons bases into a unified network.

Within seconds, 412L will provide the vital detection and tracking data to human decision makers. Precious time will be gained since compu-

tations leading up to the final decisions will be done automatically. In addition, 412L is a highly flexible system designed for use throughout the Free World. It will operate in mobile as well as fixed environments.

Currently going into prototype production, 412L has already anticipated technological advances. And, importantly, new equipment can be integrated into this versatile Air Weapons Control System in the future, assuring a complex which will remain combat-ready for many years.

176-05

HEAVY MILITARY ELECTRONICS DEPARTMENT
DEFENSE ELECTRONICS DIVISION • SYRACUSE, NEW YORK

Progress Is Our Most Important Product

GENERAL  ELECTRIC

Very **BIG** in Performance



... very small in cost !

RCA 301

ELECTRONIC DATA PROCESSING SYSTEM

For businesses with moderate data processing volume, the RCA 301 offers advanced electronic performance heretofore found only in much larger systems ... at the lowest price for any *complete* EDP system presently on the market.

The "big system" features of the RCA 301 include:

- **DATA STORAGE OPTION:** magnetic tape or new Data Record File discs that may be switched easily for different jobs.
- **HIGH VERSATILITY:** paper tape (option of 3 speeds), magnetic tape (option of 2 speeds), and punched card input/output; plus expandable memory.
- **GREATEST CAPACITY:** among the fastest and largest core memories in its price class—7 micro-seconds access time; variable word length.

- **FULL SPEED:** reads 600 cards per minute; prints 600 lines per minute.
- **SIMULTANEITY OPTION:** optional computing simultaneous with input/output permits large increase in WorkPower.
- **LOWER SITE PREPARATION COST:** less stringent air conditioning requirements; simpler installation.

The RCA 301 may be used as a complete data processing system by itself, or as an auxiliary to the larger RCA 501 and 601 systems. And, like all RCA Electronic Data Processing Systems, the RCA 301 can be tremendously expanded to handle your future needs. To the basic system, which leases for as little as \$3,315 per month, may be added a wide range of peripheral equipment to enlarge and enhance the value of the RCA 301 as your business grows.

For full information, write Electronic Data Processing Division, Radio Corporation of America, Camden 2, N. J.



The Most Trusted Name in Electronics
RADIO CORPORATION OF AMERICA

ARMED FORCES MANAGEMENT



Washington Background

McCullough Heads Task Force To Bridge Gap

Hugh McCullough, one of Vice Admiral William F. Raborn's Office of Special Projects directors, has been selected by Defense Comptroller Charles J. Hitch to "bridge the gap" that he informed the Armed Forces Management Association exists in the Defense Department between military budgeting and planning. Under his new title of Deputy Assistant Secretary of Defense for Programming in the Hitch office, McCullough will tackle the bridging job by consolidating all Defense budget-generating activities and translating them into financial summaries. As bridging tools, Hitch has promised McCullough electronic data processing equipment and the contract services of outside organizations with records of success in similar enterprises. McCullough has been serving as director of the Plans and Programs Division under Admiral Raborn. He has an impressive background of 20 years experience in the Navy's comptroller area, has received the Navy's Distinguished Civilian Service Award on two occasions, and holds the rank of Lieutenant Commander in the Naval Reserve.

Enthoven Gets Basic Bridging Assignment

Alain C. Enthoven, a Ph.D. from M.I.T., will head up the new Directorate of Systems Analysis which will do the spade work in bridging the gap. Enthoven, who used to work for the Rand Corporation and for the past year was assigned to Herbert F. York's Office of Defense Research and Engineering, will concentrate on currently available data on costs and objections. His directorate will operate under McCullough's direction. Reason behind the decision: the complete bridging process will require extensive research and major reshuffling of established procedures; time is of the essence, therefore the project will be undertaken with the tools on hand.

Jackson Seen Favored on Law Revision

Revision of antiquated conflict-of-interest and dual compensation statutes appears to have the blessing of the administration. The proposal is coupled with a recommendation for selected upward adjustments in top government executive branch salaries. The objective is to make key foreign policy and Defense jobs more attractive to outstanding private citizens, particularly lawyers, business executives and retired Regular military officers. The proposals were drafted by the Senate Subcommittee on National Policy Machinery and approved by its chairman, Senator Henry M. Jackson (D.-Wash.). Now known as the "committee killers," the Jackson subcommittee is credited with the scalps of the Operations Coordinating Board and of 17 interdepartmental committees.

Macy Approves Jackson Plans

Reactions to the Jackson Subcommittee's recommendations and findings ranged from unqualified opposition by the Government employee unions to immediate indorsement by the new chairman of the U.S. Civil Service Commission. John W. Macy, Jr., the new Civil Service chairman, told the AFM: "The restrictiveness and obsolescence of the dual compensation statutes represent a significant personnel problem requiring early attention. Such attention is currently being conducted by the Civil Service Commission, in collaboration with the Bureau of the Budget. Present restrictions prohibit federal appointing officers from utilizing skills developed in military service, and in short supply, in the national work force." Other ramifications of the subject are scheduled for an airing within two weeks at hearings by the House Manpower Utilization Subcommittee headed by Representative James C. Davis (D.-Ga.).



THE GRUMMAN GULFSTREAM In a brand new "off-the-shelf" military transport version

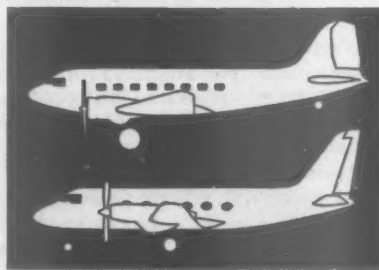
- for air evacuation
- for facilities inspection
- for high-priority personnel and cargo transport

Military transports of World War II and Korea vintage performed admirably. But today they deserve to be retired as befits any battle-weary veteran.

Typical of such transports is the DC-3—one of the finest, most reliable airplanes of its day. Its size, and ability to land and take off from virtually any military field, made it an extremely flexible transport. It has served faithfully in many roles over the past 20 years and has proved to be an excellent military investment. The Grumman Gulfstream is ready to serve as the optimum in military transport for the next 20 years, and as a comparable investment.

In the illustration, right, you see two airplane silhouettes: the first, a DC-3; the second, a Grumman Gulf-

stream. Note how closely they coincide in size. The Gulfstream is the modern pressurized, high performance replacement for the DC-3 and other older transports; equivalent to the DC-3 as a work horse transport—and costing even less to operate—the Grumman Gulfstream is a new airplane proved in service by over 60 world-wide corporations and the Federal Aviation Agency. Modernization of our country's airlift capacity for limited or brush fire warfare can be accelerated by the Grumman Gulfstream. And it's available now.



Gulfstream compared to DC-3



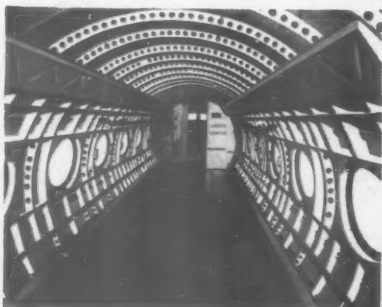
Facilities inspection

Here are the Gulfstream's capabilities: For military application, it will carry up to 24 passengers and has a transcontinental range against 50-knot head winds. It needs only 3,000 feet of runway, enabling personnel to use fields close to their destinations. It is completely independent of ground



Air evacuation

handling facilities. With its pressurization system (up to 30,000 feet), it flies above weather and traffic at a cruising speed of 350 mph and is powered by proven turboprop Rolls-Royce engines. An active develop-



Multipurpose Gulfstream cabin

ment program is in progress at Grumman for the installation of the General Electric T64 turboprop engine as an alternate source of power.

GRUMMAN
AIRCRAFT ENGINEERING CORPORATION
Bethpage • Long Island • New York

ARMED FORCES MANAGEMENT

Answer Due on Polaris

In spite of indications that NATO decision on the matter of accepting a United States Polaris offer may be delayed at least another year, the U.S. hopes to have a definite yes or no answer shortly after the NATO ministers' meeting this month.

The U.S. Polaris package included five Polaris submarines and their full complement of 80 missiles plus another 100 land-launched versions of Polaris.

The U.S. would contribute the five complete submarine weapons systems and the land-launched versions would be purchased by NATO. The entire complex would be deployed under the direct command of General Lauris Norstad in his capacity as NATO commander. But, under present U.S. law, this nation would retain custody and control of nuclear warheads in both land and seaborne systems.

France, under DeGaulle, has refused to accept atom warheads on her soil without French control. The French seek their own nuclear military capacity and have voted DeGaulle more than \$2-billion to develop the nation's independent nuclear forces. France wants more national economy and diminishing international controls, even within NATO. Acquiring a NATO nuclear capability might only delay this goal.

The British also are cool toward Polaris weapons under NATO—but for different reasons. They now enjoy a satisfactory nuclear working agreement with the U.S. and the arrival of a new nuclear power on the scene—either under NATO or in France—would complicate their present position.

Many NATO member nations argue that reaction of a NATO nuclear force to any alert would be too cumbersome and thus too slow—involving as it does U.S. consent to use of the warheads and “14 member nations all with their fingers on the button and all exercising what amounts to a veto over its use.”

AF Given Top Space Role

A Department of Defense directive signed by Secretary McNamara last month assigned the Air Force virtually total R&D responsibility in the field of military space effort. More than 91% of the \$850-million military space research program for FY 1962 is now in the hands of the Air Force.

Development projects now in existence in the other armed services—including Army's Advent communications satellite program and Navy's Transit navigation satellite—will not be removed from their present service jurisdictions under the new order.

Pentagon observers conceded the new policy statement as “virtually establishing the Air Force as the nation's central military space agency.”

Army and Navy still will be afforded opportunities to conduct their own preliminary research in space fields they consider vital to their missions—but under closely prescribed ground rules subjecting them to detailed DOD surveillance. The main control over Army and Navy research will be exercised by DOD's authority to release the “limited” funds to be made available to each service for such space effort. In the majority of instances, once a project is accepted for major RDT&E, it will move under Air Force management and control. Exceptions to this

policy, permitting Army or Navy to conduct their own R&D, “will be made by the Secretary of Defense or the Deputy Secretary of Defense only in unusual circumstances.”

The office of Dr. Herbert York, Director of Defense Research and Engineering, said the term “preliminary research” has not yet been clearly defined under terms of the new directive. When it is clearly spelled out, the extent of the limited space roles left to Army and Navy will become more apparent.

Rusk Proposals Shake DOD

Many Defense chiefs are reportedly taking a dim view of defense proposals handed to the Pentagon by Secretary of State Rusk. The nut of the Rusk proposals is to play down nuclear weapons in favor of conventional war capability.

Some Defense leaders view the Rusk plan as impractical from a strategic point of view. They note that, taken literally, such policies probably would mean discarding airborne alert plans, emergency bomber dispersals and special naval deployments of carriers and Polaris submarines.

It is being noted that part of the policy of introducing nuclear arms at both tactical and strategic levels in the nation's defense stems from the wide differences between the number of men in the Soviet armed services and the smaller totals in the U.S. armed services.

State Department informants note that the Rusk proposals represent his views at the time he took over as Secretary of State and are “not necessarily inflexible or final.” Military professionals predict that adjustments will have to be made before policies reportedly backed by Rusk can provide a realistic approach to space age strategy.

Administration Studies ANP

General Electric was notified last month that it should not cut metal for a direct cycle aircraft nuclear power plant until Kennedy Administration officials complete a re-appraisal of the program.

A decision on whether the government will proceed with the direct cycle approach, the Pratt-Whitney indirect cycle approach or both is expected soon. A less likely alternative is that the government will drop ANP entirely. The Eisenhower Administration left the insufficiently-funded project on Kennedy's doorstep—and it is among Pentagon programs now being debated.

General Electric officials stated that they have successfully tested all components, turbo machinery and fuel elements. They said they are “sure of the design” and that it will meet the so-called “York specifications” for a subsonic power plant capable of an eventual 50,000 lb. payload.

Though the company has started no fabrication because of the program's uncertainty, its engine experts believe they could environmentally test a nuclear power plant—perhaps on a B-52 test bed—considerably before mid-1965, the date given by Defense Research and Engineering Director, Dr. Herbert York.

To continue the direct cycle and test bed alone, GE estimates it will cost a minimum of \$75-million annually for the next couple of years. Parallel product improvement would raise this price tag. Side-by-side development of indirect and direct cycles could run as high as \$1-billion for the next couple of years.



ASW/SPECIAL REPORT

What Industry Thinks Of the ASW Problem

In September, 1959, Armed Forces Management polled industrial firms connected with ASW to find out "What Industry Thinks of the ASW Problems." This article is the result of a similar poll, conducted last year, to find out what industry thinks of progress (or lack of it) since 1959.

by James Lewis



AT THE START of World War II, Germany almost pulverized our supply lines with only 48 submarines. Today, Russia probably has more than 450 submarines, some carrying surface-launched missiles, others running, presumably, under nuclear power.

And it's a better-than-even bet, in 1961, that people battling the Anti-Submarine Warfare problem go to bed at night dreaming of some new super-sensitive, compact foolproof device that can detect, identify, track, and destroy enemy submarines from as far away as the cruising range of a good space ship.

Unfortunately, dreaming hasn't produced that sure-fire piece of equipment. Nor will it. What progress has been made (with two or three exceptions) has come from brain bruising, ulcer provoking struggle of frustrated hunter-killer forces at sea trying to solve tomorrow's headaches with obsolescent gear.

And, according to a recent ARMED FORCES MANAGEMENT poll, industry (to whom Navy made a powerful bid for help two years ago) thinks progress will continue to be too staggeringly slow—until a central authority in Navy is given the power to control and direct the vast resources empire working on ASW.

Commented one industry laboratory: "It seems to us that there is still reluctance on the part of the Navy to go into this thing with the effort that the threat demands. Before it spends large funds, Navy has been asking industry and science for a breakthrough. It has become increasingly plain in the past year that no new universal magic technique is forthcoming.

"On the other hand, research leading from established techniques has shown a potential increase in ASW capability virtually amounting to a 'breakthrough'—yet, there is no vigorous policy established for execution of an effective program."

What has been done in the way of improving our ASW capabilities since the days of World War II? A lot of the same methods are still used today—modified several times, but basically the same (as are the inadequate results).

Says industry: "Progress in ASW is regrettably slow. Some authorities have publicly stated that the U.S. is in 'good shape' in terms of fighting World War II. Even this seems to be an overstatement. We are actually in worse shape today because the submarine menace

ARMED FORCES MANAGEMENT

has increased manyfold. The Nation's ASW capability does not appear to have advanced in proportion to the growth of the threat, and no breakthrough comparable to radar against aircraft seems to be on the horizon."

Another comment: "The ASW problem today is undoubtedly one of the most formidable tasks, both from the standpoint of national defense and the technological problems associated with its solution. Progress has been made toward solution of the ASW problem. Much of this progress has, however, stemmed from improvements based on current and past techniques and capabilities."

One word of caution: all firms interested in getting into the field are not unanimous in indicting all facets of the organizational miasma—but most agree Navy is in far more trouble (particularly in its relation to industry) than either will admit publicly.

Countered one company president—to the prevailing gloom, "Since existing ASW techniques are at least marginally effective against diesel-electric submarines, which now and in the immediate future will dominate the Soviet submarine capability, our ASW situation cannot be rated as critical; therefore, funds and efforts in this category continue to be limited in reference to currently higher priority military programs.

"Should the threat be increased by a Soviet shift to nuclear powered submarines, which is possible, a greater effort will be required. Further, although it is known that the Soviets possess missile launching submarines, there are no indications that they are commensurate with our Polaris system in performance or weapon strategy."

Granting this point, several questions crop up. Could the U.S. repel an attack by all 450-plus Russian submarines which combine diesel, nuclear and missile-firing submarines? Do we wait for another Pearl Harbor before we start countering? Or do we get a head start on the ability to suppress any such attacks?

Even here, all industry people are not in agreement: "The past year has produced tremendous increases in the potential threat that the submarine poses to the U.S. in the immediate future. The Polaris submarine program has proven the need for increased ASW efforts to combat such a submarine in enemy hands. The increased effort, and current efforts, must be more efficiently

and effectively managed."

This is where critics say Navy falls down. Navy is concentrating on modernizing methods on hand instead of developing new ones. Industry is convinced that much more Research and Development is needed instead of the sit-back-and-wait-for-a-breakthrough approach.

One comment on attitudes: "We feel that very little visible improvement is discernable in the Navy's attitude toward ASW. The Navy has still to centralize its overall ASW effort, and the very same situation exists today as did last year."

One big complaint: Navy fails to recognize work done by industry on its own. Some companies have trained personnel, spent company funds, built prototypes, run tests and still failed to get even "yes" or "no" recognition for their work.

An executive of one of the top Navy

contracting companies sums it up this way: "Research and Development is the seed corn in solving major ASW problems. Navy should start picking up the R&D ball and show faith in what industry is doing.

"This pays off in product contracts and puts us on the right track. It is also acknowledgement that Navy is aware of the effort being put out by industry." His kicker: "I refer to comparatively small dollar investments in research efforts, not big money development and production contracts."

A controversial subject in industry regarding ASW is the central authority concept of a Special Projects Office. Many say a central authority is what's needed for Navy ASW and others say it won't work. The big problem seems to be that Navy has no single person industry can go to for an incontrovertible Navy answer. As one industry man said, "there are a dozen people

Here are the comparative results of the industry polls conducted in 1959 and 1960 by ARMED FORCES MANAGEMENT:

1959		1960
130	Letters Mailed	130
65 or 50%	Replies Received	72 or 55%

By percentage (of replies received) here is how the companies reacted to these four major questions:

Q. Do you think that progress in ASW has been satisfactory?

	YES	NO	NO COMMENT
1959	4%	94%	2%
1960	24%	52%	24%

Q. Do you think increased funding is needed in the ASW R&D program?

	YES	NO	NO COMMENT
1959	62%	..	38%
1960	75%	7%	18%

Q. Do you feel that a Central Information Office is needed to ease the need-to-know situation?

	YES	NO	NO COMMENT
1959	64%	10%	26%
1960	45%	31%	24%

Q. Do you feel that a central authority or "Special Projects Office" is needed?

	YES	NO	NO COMMENT
1959	50%	8%	42%
1960	51%	34%	15%



Anti-submarine warfare units conduct joint exercise at sea . . .

who can say 'no' and very few who can say 'yes.'"

Says another: "The problem that faces industry dealing with the Bureaus is that the ASW program seems still diffused and uncoordinated among the Bureau structures. Opinions have been expressed in the Bureaus, however, that CNO is not giving out the requirement for them to act on programs. The Bureaus also say that they have to spend too much time putting out political fires."

Not as Effective

The rebuttal from another firm: "We do not think that the 'Special Projects' type of set-up would be nearly as effective for ASW as it was for the Polaris Missile system. This opinion is based primarily on the fact that ASW involves virtually every component of the Navy, and some components of the Air Force.

"It cannot be keyed to a single ship or single weapon system, or even a single branch of the Navy. Having a central project office other than that which is in existence now in OPNAV would probably result in increased red-tape, expense, delays, and wasted effort, rather than accomplishing its intended purpose."

One special projects answer went like this: "Could be effective primarily because both the Bureau of Naval Weapons and the Bureau of Ships are independently responsible for certain important aspects of this problem without adequate coordination. Closer attention to the overall systems viewpoint would appear more readily attainable with such an office being responsible to the Secretary. Probable strong and continuous management is more important than more money, but both are needed."

Like any other project in the services, money is always needed, but here is what and where industry says it is needed in ASW:

"Substantially more money is required and can be spent effectively in ASW. Substantial portions of the money now earmarked for ASW are in reality spent for other purposes such as aircraft carriers and their complements of aircraft, not always with real ASW effectiveness."

"As nearly as we can tell, many of these areas demanding research are being neglected by the Navy for lack of adequate funding. It goes without saying that the longer such expenses are delayed, the longer and probably more difficult it will be to solve the problems."

"It is generally conceded that more money should be spent on target location and classification. In my opinion this field should be saturated with money; i.e., every worthwhile, or even thought-to-be-worthwhile, idea in this area should be given all of the money necessary to press it through the feasibility stage."

Other Questions

Another: "Yes! The only qualification being that the Navy should educate themselves in the manner and method in which they spend it. This may require stronger program management type of responsibility, e.g., control of a program from start to finish with responsibility in either bureau or laboratory—this is practically nonexistent at present."

Another question asked was whether or not industry thought the need-to-know problem had been relaxed since 1959. The problem that seems to exist now is that no one seems to know exactly what Navy wants. Some comments on the need-to-know question:

"Need-to-know is still quite a problem in some areas, but the Navy certainly has tried and has accomplished considerable relaxation of the requirements. Methods for obtaining necessary information have been set up by the Navy, although it is still very difficult

to establish need-to-know in the more sensitive areas."

"As to the dissemination of information, we feel that a great improvement has been achieved as a result of the no-cost contract program which the Navy has implemented. Of tremendous value is the NSIA ASW program which makes available to industry a great deal of information, sometimes critical information, thru its good offices which would otherwise be unavailable."

One question asked industry pertained to the progress made in ASW since 1959. Typical were these answers:

1—"According to the popular press, there has been no significant progress made in ASW during the last year. This is quite true. There are 'new' types of weapons, planes, and so on, but these are really modifications of existing equipment. No new types of detection equipment are available. No new methods of localization have been revealed. No progress of note has been made in classification."

2—"Industry and Navy have taken some rather significant steps in the areas of ocean and shore-based surveillance, variable depth sonar, hydrofoil-boat development, airborne ASW systems, ocean instrumentation for basic research, etc. I feel that a lot more should be done and would be if only more money was made available. However, I'm afraid the old problem of 'Lip Service' is still with us in some of the aforementioned areas."

3—"Substantial progress has been made in ASW during the past year, particularly in sonar and weapons. Considering the small percentage of the DOD budget which goes to ASW research and development, this progress is encouraging, but the progress does not meet the need."

In general, the answers today are the same as those of 1959—Navy must do a lot more to bring its ASW capabilities up to par. But industry thinks the Navy can move a great deal faster if industry's offers of help are utilized a great deal more effectively than they have been to date—by vesting more power in key decision makers and educating the purse string controllers.

Once the problems of submarine detection, identification and localization have been met, three-fourths of the problem will be solved.

The big worry now: what will it take to pressure the U.S. into stepping up the ASW program to the optimum pace—one comparable to that in the missile/space program? At this point, industry fears it will be a missile plopped in the Pentagon courtyard from 10 miles off Coney Island—a point in time far, far too late. ■

What They Had to Say

As in last year's AFM poll, industry, vitally concerned with the problem, was very outspoken—in

Progress

"... Technically, progress since 1959 seems to have been primarily in the nature of incremental improvements on existing techniques and weapons. At present, however, the nuclear submarine continues to outstrip our anti-submarine countermeasures."

"... Progress during 1960 has been made in improved tactical use of current equipment. Introduction of new equipment has been slow."

"... We feel that during the past year an acceptable amount of progress has been made on this major problem, although there are still a number of areas in which our capabilities, both present and foreseeable, are inadequate."

"... As to the progress made in ASW when compared to the progress in the development of nuclear submarines, the outlook is not good. As promising as many of our current approaches are, the situation becomes pretty dismal when one takes into account the capability of this type of target."

Special Projects Office

"... The ASW problem should be given the same high visibility in the Navy as was the ICBM program in the Air Force. The Navy should establish an organization similar in scope and importance to the Air Force's Ballistic Missile Division to manage the complex problem of ASW development."

"... ASW weapons systems cut across so many established (statutory) and logical lines of authority that such an office would be impractical."

"... A major step forward would be the establishment of a management office, entitled 'Undersea Warfare Special Projects,' which would centralize management control of the undersea warfare problem and prevent duplication of effort in the various bureaus and Navy laboratories concerned."

"... The concept of an ASW Special Projects Office is necessary from the viewpoint of industrial organizations attempting to participate in the ASW program."

Need-to-Know

"... The relaxation provided through the use of OPNAV Instruction 5500.14 which gives industry 'need-to-know' in certain areas has proved helpful. However, a better interchange of information is still required."

"... It appears to us that the office of CNO has been making a sincere effort to relax 'need-to-know' requirements in order that contractors may contribute more constructively to the Navy's programs. Unfor-

most cases with two and three page replies. Here is what they had to say in these key areas:

tunately, the technical bureaus do not in all cases appear to be following the CNO lead."

"... We have never felt any need for relaxation of the need-to-know policy. Indeed, I believe that it would be a serious mistake to relax it very much."

"... The need-to-know policy has been relaxed sufficiently to enable a better job to be done, although security regulations are still strict."

Central Information Office

"... The matter of a central information office has been discussed pro and con for many months. It has been said that it would be too costly, impractical, etc. However, it is interesting to note what the Soviets have done in the way of an automated central technical information center, and it is not confined to one field! I'm sure it has proven invaluable to their scientific and military personnel and the same would be true in this country."

"... No. The money necessary to staff, equip and operate such an office could be put to better use in direct funding of needed ASW research and development or production."

"... A central information office could materially reduce the redundancy of overworked ASW concepts and save the time of uninformed workers in this field."

"... A central information office is not considered one of the prime requirements in the ASW field since the Bureau of Weapons has centralized most of the ASW effort in both R&D and hardware."

Funding

"... Additional money and effort should be put forth in the Detection, Classification, Identification, Tracking, and Weapons Development areas, especially in research and development to provide breakthroughs."

"... It is our opinion that adequate money has not been appropriated for research and fundamental development in the ASW field. There are many areas that require research if our most serious ASW problems are to be solved."

"... Increased funding will be required, if the ASW problem is to be pursued with greater vigor and effectiveness. The outstanding need is for a greater number of contracts for feasibility and research studies in the ASW field."

"... Funding is not nearly as important as are qualified people. If the right industry, service and university scientists were brought together for a summer session, a great deal of progress might be made."

Navy Challenges Industry Criticisms On ASW Problems

ARMED FORCES MANAGEMENT MAGAZINE has brought to our attention their article based on their 1960 poll of industry on ASW questions.

We notice that there's some disagreement in the tabulated opinions of those polled who undertook to reply, and also that the 1960 cross-section of opinion is rather different from that of the year before. There's not much to be gained by speculating on the reasons for these differences, since we don't know who their authors were, or what facts were available to which authors of what opinions.

Most readers are aware that the Navy Department is responsible for providing to our established national command structure all the elements of naval force which have been determined to be needed in support of national policy. The Department provides these forces; the appropriate Unified Commander in the national command structure deploys them and operates them.

There is no power on earth today which can stop these naval forces from going anywhere in the oceans of the globe the national command orders them to go, doing their assigned task when they get there, and staying for as long as it takes to get it done. This is the view of those who have all the information, and who have to be prepared to do the job when ordered; and it is a view which is supported by every event of recent and current history.

The tasks for which naval forces are responsible require that we provide many different sea warfare capabilities. ASW is one among these, and specifically it is the one which assures that naval forces can go where needed despite possible submarine opposition. Antisubmarine Warfare requires a numerous and diverse force, fitted with effective weapons and equipment. This we have in today's Navy, for today's tasks.

There is a problem in ASW. It is to keep our antisubmarine forces ahead of the growing capabilities which it is logical to expect in potential enemy submarines, on the basis of what's been accomplished in our own. Six years of hard ASW training and experiment with our own nuclear submarines have given a solid picture of what this takes. If anybody is dreaming of breakthroughs in order to get it he's not in the Navy, for two reasons: the Navy knows breakthroughs are not required; and the Navy doesn't dream, it takes action—again as shown in all recent and current history.

Research has developed the kinds of things we require. What is needed now is a great deal of expensive hardware, together with continuing good research to keep successive generations of it coming, and crack professional officers and men to use it. The individual units of hardware are increasingly costly compared to their predecessors because the job they're required to do is growing so much more complex; the demands upon the skill of the crews go up correspondingly; and we need the items in the fleet in quantity because in ASW there is no substitute for numbers.

All this takes money, and it's going to take increasing amounts of money. This the Navy hopes to get, and will press for in the appropriate forum. ■

But...On Record Are:

Representative G. H. Mahon (D-Tex.) Chairman, House Military Appropriations Subcommittee: "The Germans almost swept our shipping from the seas in World War II beginning in the early days of the war with a nucleus of only 48 submarines.

"... we made a recommendation for the application of the Polaris type of single manager system to the ASW problem . . . this does not apply to the operational aspects of the problem . . . We are primarily interested in a single manager for research and development of weapons, equipment and the like, which will be adequate to do the ASW job.

"The Navy has established a position called ASW Readiness Executive, directly under CNO . . . but they have been able to exercise little or no actual authority to get things done . . . This is typical of the scatter-shot operation for antisubmarine warfare which the Navy has always had. The Navy would not, of course, want to change it.

"The House Committee on Appropriations, without denying the importance and validity of requirements for carrier forces, has tried to bring to the forefront the urgent need for greater emphasis on antisubmarine warfare capability. This effort has met with strong resistance."

VADM E. B. Taylor, USN, Commander, Anti-Submarine Defense Force, U.S. Atlantic Fleet: "The Free World faces a submarine threat of unprecedented magnitude. The Soviet Colonial Empire possesses more than 450 submarines, a great percentage are of modern construction and capable of sailing whatever ocean waters they desire to penetrate.

"The dark side of the ASW picture relates to future requirements . . . There is not an adequate answer yet to the nuclear submarine . . . This true submersible presents problems of a whole new order of magnitude. The threat of nuclear submarines armed with long-range ballistic missiles requires what was once referred to as new dimensions of strategy."

RADM H. A. Yeager, USN, former Navy Anti-Submarine Warfare Readiness Executive: "All we need to solve our anti-Submarine warfare problem is a system that can be installed in an airplane that can fly at 40,000 feet, that will spot and identify a submarine at any depth as far as the plane's horizon extends. The same plane would be armed with a weapon that could kill anything it spotted. This, of course, we will never get."

ADM Arleigh Burke, Chief of Naval Operations: "We need to improve our capability to combat submarines. Since World War II, the submarine has progressed faster than the antisubmarine warfare capability to combat it."

RADM Philip D. Gallery, USN, (Ret.): "Our ASW capability since World War II has increased but the submarine's capability against surface ships and shore targets has increased faster. If we are restricted to sonar for detection we must find ways of piercing the 'Thermal Curtain.' Our number one problem is *detection* at great enough ranges to destroy the submarine before it can harm us." ■

PENTAGON PROFILE

Rear Admiral Lloyd M. Mustin
*Anti-Submarine Warfare Readiness Executive
Office of the Chief of Naval Operations*

"On Top of the Problem"



"ANTI-SUBMARINE Warfare is a blood-and-guts affair. There's no such thing as push-button warfare in killing submarines. It's a real dirty business—long, hard and brutal. The descriptions in 'Cruel Sea' and 'The Good Shepherds' were pretty close to the mark, and would be today." This, in the words of Read Admiral Lloyd Montague Mustin, Navy Anti-Submarine Warfare Readiness Executive, sums up the major feature in combating one of the most formidable enemies ever to oppose the U.S. Navy.

When picked by CNO Burke in May, 1960, to relieve Rear Admiral H. A. Yeager as head gladiator of the Navy ASW forces, Admiral Mustin was commanding the Naval Base and Key West Forces at Key West, Florida. He took the reins at a time when Congress was turning the heat on the ASW program and policies, and the public was beginning to wonder if the Red submarine threat wasn't even greater than authorities were saying it was.

Although Navy has been, (and is still being) criticized for not spending enough money on ASW R&D projects, new weapons, and for not producing a real sure-fire counter for the underwater enemy, Admiral Mustin has probably seen more technological progress in ASW than any of his predecessors. Much of it at the time he took over was either on drawing boards or in the development/prototype stages. But the ASW forces are now being equipped with detection, tracking and kill equipment which represents tremendous advances over anything available anywhere in the world, and there is more on the way to the fleet.

Although it has been publicly stated that the U.S. ASW defenses aren't adequate for the problem, Admiral Mustin denies this emphatically. He says: "The U.S. Navy is clearly on top of the problem today. Two examples of why I say this: (1) the Korean War, and (2) the Lebanon landings. In Korea our ships laid off the coast and shelled the Communists day and night, at times and places of our own choosing, while our carriers poured in the close support aviation, and cargo ships delivered 99.6% of the tonages of military supplies used ashore. In the landings at Lebanon, our ships pulled

(continued on page 58)



Edward J. Engoron
". . . difficult business"



Col. W. B. Latta
". . . insufficient emphasis"



Col. Charles A. Stone
". . . manage by exception"

Can Defense Balance Costs of Maintenance As Expenses Climb?

Each of the services has its own tools for tackling this paramount problem in Defense maintenance management. Each can show progress to date toward eventual solution of the dollar difficulty. All agree that the objective is attainable provided all hands join forces under competent leadership in this battle for billions.

by Paul Conlin

MILITARY maintenance has always been a problem. The warriors of old recognized it when they retrieved arrows from the field to be refeathered and used again as ammunition. Even the inventor of the wheel probably discovered it would last longer and work better with an occasional grease job.

Nowadays, military maintenance has multiplied its complications. Military inventories currently are valued at about \$110 billion and the cost of maintaining this mountainous assemblage of weapons, supplies, equipment and facilities is estimated at \$7 billion to \$8 billion a year. The management of this maintenance is a billion dollar headache. And even though values and costs probably will continue to grow, the maintenance managers in the Pentagon are well aware that their job is to apply the brakes whenever possible by making better use of the personnel and equipment which are available right now.

Edward J. Engoron, director of maintenance engineering for the Department of Defense, describes maintenance management as a big, difficult, unglamorous business with only one common denominator—dollars. He traces its problems back to pre-World War II days when military service was a career and not much money was in-

volved. Then there existed a certain stability of weapons, equipment and people and when a weapon reached the hands of the user it was fairly well "de-bugged."

With the advent of the World War II, he recalled, masses of new equipment were introduced and much of it had not been well tested. "We never really got on top of the maintenance problem before the end of World War II," he said, "and then the men who had learned the necessary skills were demobilized."

Next came what Mr. Engoron terms the "jet age" with its rapid development of electronics and technology. "We made progress until Korea," he said, "and then the same problems developed all over again. New equipment was not well tested and demobilization took away our skilled personnel."

Following Korea came a tremendous drive for new systems and new equipment in the fields of electronics, communications, weapons and power plants for all the military services. Former Defense Secretary Wilson recognized that he was faced with a real problem of maintenance management and in 1954 he established the Office of Management Engineering. A year later, the management engineers found that more than 800,000 individuals—

ARMED FORCES MANAGEMENT

*Doorway to all Europe
for your product...*

**PAN AM
WORLD-WIDE
MARKETING
SERVICE**



Now, in one step, the most complete overseas marketing service ever developed helps you do business with Europe's 343,000,000 consumers.



WORLD-WIDE INFORMATION

Current, valuable, authoritative information on 114 world trade centers in 80 foreign lands!

- Pan Am gets marketing facts—plus special needed information.
- Pan Am can help find markets for your product, also distributors, buyers, bankers overseas.
- Pan Am advises all the way on containers, insurance, rates, routes, collections.
- Pan Am monthly magazine lets you in on "inside" information, overseas opportunities!

WORLD-WIDE TRANSPORTATION

More flights direct to more major markets by the world's largest, fastest overseas air cargo fleet!

- Fastest delivery overseas, from 15 international gateways in U. S. plus faster, new ground procedures.
- One source for documentation, plus world's largest international truck-air system, cuts red tape.
- More space, speed! More all-cargo planes, and over-ocean Jets.
- Rates lower than ever! In more and more cases distribution by Pan Am costs less than by surface.

WORLD-WIDE REPRESENTATION

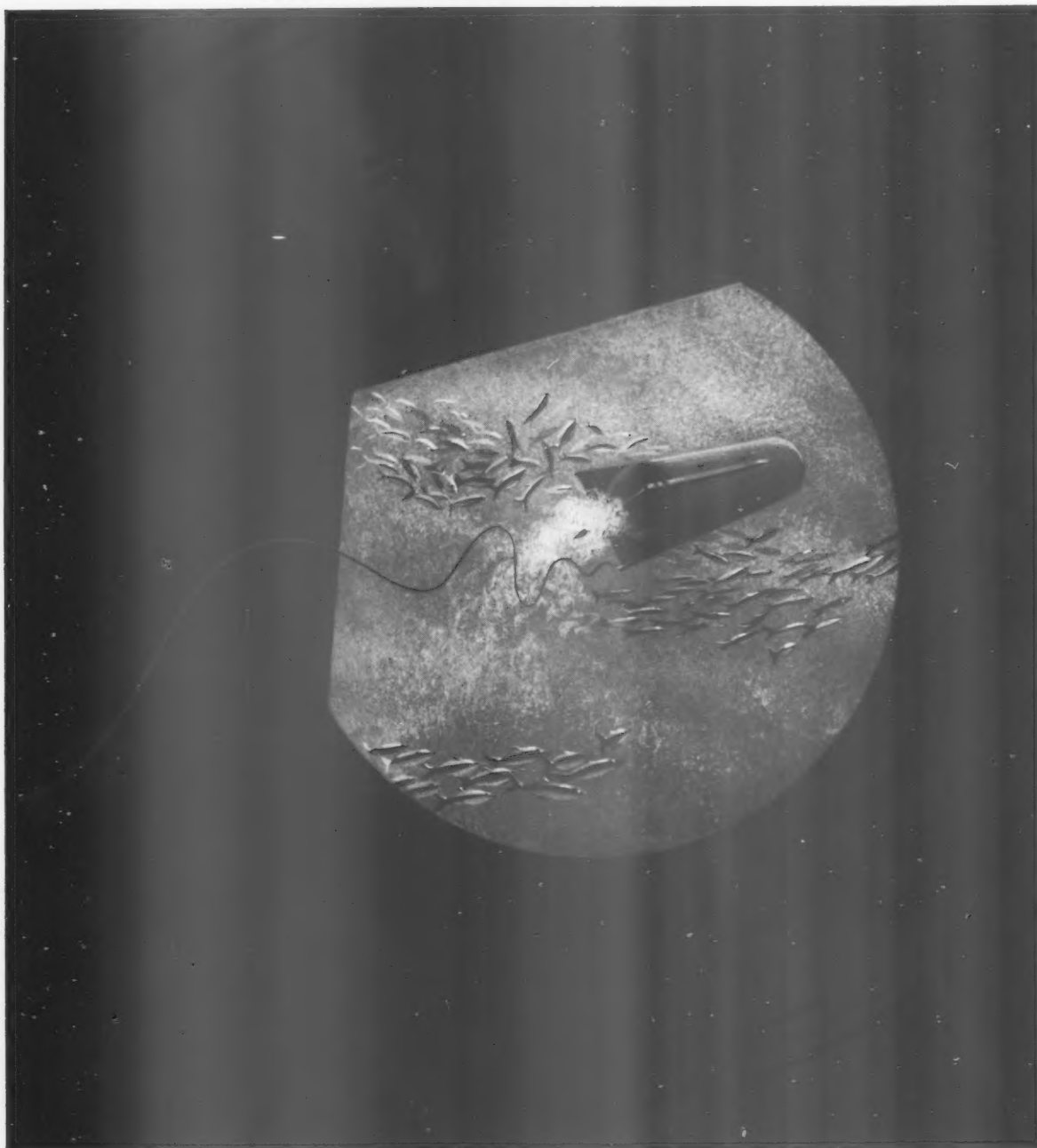
More American and English-speaking personnel to represent you and your product overseas!

- You get 114 world-wide offices—at no extra cost! Your product is handled the way you want.
- American viewpoint on the spot from American-trained personnel with local market know-how.
- World-wide contact service! Pan Am's integrated sales/service organization takes the hitches out of world marketing.
- World-wide follow-through makes world's surest delivery!

PAN AM PUTS YOU IN BUSINESS ABROAD—WITH ONE PHONE CALL!

*Trade Mark, Reg. U. S. Pat. Off.

Call your cargo agent, freight forwarder or Pan Am office.



RIGHT NOW, VITRO IS HELPING THE NAVY change torpedoes into underwater guided missiles. ■ Today, wire guided torpedoes are key ASW weapons. Wire-guidance and bearing-rider fire control are essentials in modern underwater weaponry. Both were developed at the Silver Spring Laboratory. ■ Vitro engineers were responsible for the first wire guided torpedo system and its subsequent developments. These technical specialists are now engaged in programs to apply advanced, original concepts to underwater ordnance.

Vitro

VITRO LABORATORIES/Division of Vitro Corporation of America/SILVER SPRING, MD. • WEST ORANGE, N.J. • EGLIN AFB, FLA./OVERSEAS: GENEVA • MILAN • BOMBAY
SCIENTISTS AND ENGINEERS: JOIN THIS TEAM

600,000 military and 200,000 civilians—were working on the maintenance of weapons and equipment, exclusive of buildings and grounds. Total inventory was about \$100 billion housed worldwide in some 21,000 structures with 250 million square feet of floor space. The maintenance costs amounted to approximately \$20 million a day.

In the Engoron estimate of the situation, his problems stemmed from two factors. One was the complexity of the weapons and equipment as compared with the abilities of the personnel in maintenance work. The other was the sheer volume of maintenance actions involved. He knew his job could not be done overnight so he set up objectives to serve as a road map toward improvement. He felt that management could do relatively little regarding the problem of volume and that the most promising prescription for improvement was fewer people and fewer installations.

Accordingly, one of the goals he set was to influence the design of new weapons so that they would be more maintainable and repairable by the service user. Mr. Engoron insists that maintainability is not to be confused with reliability which is adequate performance by a weapon when called upon. "We do not expect that every single piece of equipment be maintainable in the field or by technical morons," he said. "What we do expect is that every piece will be capable of being maintained by service people in the environment where the maintenance will have to be done."

The services have a shortage of skills and Mr. Engoron would be the first to admit it. He pointed out that in the electronics field only 17 out of 100 men reenlist. He said that only 55 of 100 are high school graduates and that less than three percent attended college. There is a small input of skill and an increase of outgoing skill. He does not look for much relief in the future.

"But the situation is not too bad," he said, "because the more people who enter industry with a knowledge of service problems, the better it is for industry. Maybe we suffer from not enough skill in designs. We are getting enormously increased support from industry in this area. This office is a catalyst not a channel and industry is becoming increasingly aware of our problems. Industry knows that better management is just plain good business. The days when production, shipment and invoice were enough are gone."

When a weapon is new, Mr. Engoron feels, industry support is vital so that the military services may achieve technical competence in its operation as soon as possible. This in-

dustry support must be planned on a time-phased basis before introduction of the new weapon and may be combined with "in house" support, but it must be improved.

One of the most serious obstacles facing military maintenance management, in his opinion, is the constraint of time. "There is too much emphasis on development lead time and production lead time," he said. "What we need to emphasize is combat ready lead time. Our only reason for existence is placing in the hands of troops reasonably maintainable reliable weapons and equipment. That's our job. Desks and drawing boards in the Pentagon do not tell what the weapon will do. It's the customer who must be satisfied."

Mr. Engoron's convictions in this area recalled a statement by Lt. Gen. Arthur G. Trudeau, Chief of Army Research and Development. "As machines become more necessary in combat operations," he said, "we must resist the tendency to make them more complex to operate. It often occurs to me that we are in danger of outstripping ourselves in the technological field so that some day the machine may become the master of the soldier. We can never afford to let this happen—otherwise, we may well find our machines useless on some future field of battle because man cannot cope with them."

As in the other services, the maintenance problem in the Army has been growing rapidly over the past decade and for precisely the same reasons: the wholesale introduction of more and more complex, sophisticated and costly equipment. Rapid scientific advances have resulted in a requirement for more and more maintenance personnel with high and higher technical skills.

In complete agreement with Mr. Engoron and Gen. Trudeau, Col. W. B. Latta, chief of the materiel maintenance division of the Army's Office, Deputy Chief of Staff for Logistics, had this to say:

"Scientists and engineers in industry and government have been so busy designing equipment to do things that have never been done before that they have put insufficient emphasis on the problem of the people who must maintain this equipment. If this trend is not reversed, we will ultimately have a battlefield populated by technicians rather than soldiers. To survive, then, on the battlefield of the future, it becomes a military necessity that we have reliable and relatively maintenance-free equipment."

The Army's maintenance bill runs from \$1.5 billion to \$1.7 billion a year, or about 15 percent of its current total budget of \$9.9 billion and about 6.5 percent of its total inventory of about \$24 billion. This bill is for parts, labor,



Maj. Richard A. Bauer
". . faulty communication"



Capt. T. C. Gurley
". . FRAM is answer"



RADM E. J. Peltier
". . maximum utilization"

tools and test equipment. If the cost of training were included, maintenance costs might be estimated as high as \$2.5 billion.

The Army has a three-fold program for obtaining reliable equipment and effective maintenance while insuring fiscal solvency. It calls for the simplification of maintenance before equipment reaches the field, increasing the effectiveness of maintenance support when equipment reaches the field, and improvement of maintenance management when equipment reaches the field.

To illustrate the utmost necessity for keeping a tight rein on maintenance, Col. Latta pointed out that in 1957 only 22 percent of the Army's maintenance funds went for aircraft and missiles whereas in Fiscal Year 1962 about 56 percent of the funds are earmarked for these items. The result is that only 44 percent of the maintenance funds can be applied to conventional equipment such as tanks, bulldozers, radios, etc. This squeeze is continuing in aircraft and missiles and in the next five years the dollar value of Army aircraft is expected to double.

The Balance

In the simplification program, the Army is injecting maintenance thinking into the research and development cycle so as to bring maintenance and operational considerations into balance. This is being achieved by reviews by maintenance engineers at seven specific points in the development of new equipment.

The Army also wants maintainability to be spelled out in the contract specifications for new equipment. To date, progress has been slow in this area, but studies are being pushed for a way to express maintainability objectives in meaningful, measurable specifics.

Another aspect of simplification of maintenance is the modification of equipment after production whenever maintainability will be significantly improved. As an example of this activity, contracts have been let for the accelerated testing of aircraft. Through a combination of accelerated testing and modification of fast-wearing parts, a goal of 1,200 hours between overhauls is being sought.

In the second portion of the program, calling for greater effectiveness of maintenance support, the Army emphasizes the manner in which the equipment will be used, its geographical location, and its inter-relationship with other systems. Although generally utilizing the five-echelon system, the Army found that in the case of new systems such as Redstone, Pershing

Annual costs of equipment maintenance compared with inventory values for the three armed services are estimated by the Department of Defense as:

<u>Maintenance Costs</u>		<u>Inventory Values</u>	
Navy	\$2,389,200,000	Navy	\$ 44,288,000,000
Air Force	\$3,032,000,000	Air Force . . .	\$ 41,652,000,000
Army	\$1,600,000,000	Army	\$ 24,173,000,000
<hr/>		<hr/>	
Grand Total .	\$7,021,200,000	Grand Total	\$110,113,000,000
Ratio of total maintenance costs to inventory value: 6.4 percent.			

and Zeus that the first four could be telescoped into on-site maintenance and the fifth designated as off-site.

Using prototypes, maintenance engineers evaluate by operating, disassembling and reassembling. They determine questions of interchangeability, standardization, and the necessity for special tools and special test equipment. All of these findings are listed in maintenance allocation charts which determine which maintenance echelon will have support responsibility and which will stock particular parts. This is followed by maintenance manuals using a pictographic technique which instruct the appropriate echelon specifically on what is needed to know for the accomplishment of its particular job.

The final part of the program is the improvement of the management of the maintenance that must be done. The Army determined that some equipment was being overhauled when its real value did not warrant it or when it could have been repaired at lower echelons. During the years 1959 through 1961, the number of vehicles evacuated in Continental United States for depot overhaul was reduced from approximately 1,800 per month to between 250 and 550 per month. Aircraft which formerly were completely overhauled every three years are now overhauled only when inspections show that overhaul is absolutely needed. This resulted in 1960 in a reduction in aircraft overhaul costs from \$29.2 million to \$13.8 million.

Spare Parts

In this connection, the Army found in conjunction with Johns Hopkins University researchers that it is never economical to overhaul a ¼-ton truck. This vehicle has a useful economic life of about six years and should then be utilized as a source of low-mortality parts for other vehicles. This policy is now being applied to ¼-tons in the inventory and to the new M151 ¼-ton which is being procured.

"Studies on the economics of maintenance are underway on other equip-

ment," Col. Latta said, "including tanks and armored personnel carriers, Engineer construction equipment, Quartermaster handling equipment, on aircraft and on Signal communication equipment."

The aggressive washout of uneconomically repairable equipment has produced a significant by-product in equipment hulks as an important source of low-mortality parts.

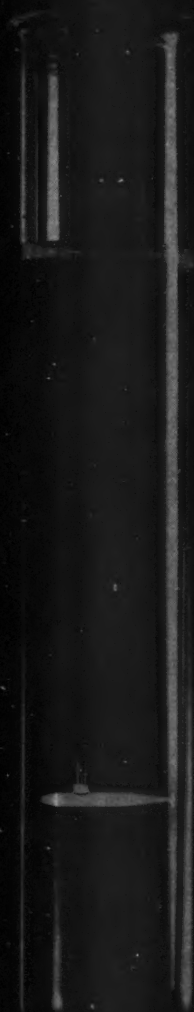
"For instance," Col. Latta said, "we will buy and stock only about 300 parts for the M151 as compared with about 1,600 parts for the older ¼-ton. This complements another important program—the reduction of stockage lists to provide only high-mortality, fast-moving repair parts. We call the use of low-mortality parts from these bone yards 'controlled cannibalization.' Proper application of the process results in a significant reduction in the requisitioning of non-stocked repair parts. In time of war, we plan to provide only the fast-moving parts and let cannibalization provide the rest."

The IROAN Concept

Another new technique adopted by the Army for maintenance management is called IROAN, for "Inspect and Repair Only As Necessary." Previously in depot overhaul, the Army completely disassembled and rebuilt all its end items and components and then reassembled them. Today, disassembly and repair are carried out to the extent that engineering and diagnostic studies indicate that this is necessary. This same process is being extended to all other echelons of repair, Col. Latta said, and parts are being replaced only when their useful life is definitely over.

Col. Latta credits two generals as architects for the improvement of Army maintenance management. They are Gen. Williston B. Palmer, now Director of Military Assistance for the Assistant Secretary of Defense for International Security Affairs, formerly Army Deputy Chief of Staff for Logistics, and Lt. Gen. Frederic J. Brown, Commanding General of the Army's V Corps in

*A Step
Ahead of
the State of
the Art in
Anti-Submarine
Warfare*



400,000-gallon test tube for ASW research

ASW research at General Dynamics/Electronics gets a powerful lift from a giant research tool . . . the largest privately-owned indoor facility for underwater acoustic testing. It's a circular, open-topped test tank, 48 feet across, 30 feet deep, complete with automatic test instrumentation for all types of acoustic measurements.

Overhead equipment, capable of hefting a 2½-ton transducer, can position a target or a transducer anywhere in the tank. Measuring equipment can be placed on the surface, to study the air-water interface as part of an acoustic transmission path. Underwater lights and a viewing port at the fifteen-foot level permit direct observation or photography.

Designed for great flexibility, the tank is the finest ASW research tool in the industry. It provides General Dynamics/Electronics

with a commanding capability in the exhaustive testing procedures needed to develop and test advanced Sonar equipment.

Overall, General Dynamics/Electronics has a wide range of experience in the development and production of ASW equipment. Included in this background are the AN/SSQ-38 (XN-2) sonobuoy now under development, the AN/ARR-52 transistorized, high-density sonobuoy receiver now scheduled for production, and the AN/UQS-1D mine-hunting sonar, on which deliveries are now being completed.

For further information about ASW research and development at General Dynamics/Electronics, write for the illuminating facts.

Engineers and scientists interested in challenging opportunities are invited to send résumés to Manager, Engineering Employment.

GENERAL DYNAMICS | ELECTRONICS
MILITARY PRODUCTS DIVISION ROCHESTER 3, N. Y.

GENERAL DYNAMICS | ELECTRONICS IS A DIVISION OF GENERAL DYNAMICS CORPORATION

Germany, and former special assistant to Gen. Palmer.

The magnitude of the maintenance function in the Air Force is reflected in the fact that some 40 percent of the USAF funds aside from the dollars earmarked for the purchase of new equipment is spent on maintenance. In addition, approximately 37 percent of all Air Force personnel are assigned to maintenance activities. When the procurement of spare parts such as engines, tires, generators, pumps and "black boxes" is taken into consideration, the Air Force maintenance job eats up more than one half of the total funds available.

Big Business?

Despite the amounts involved in maintenance itself, Col. Charles A. Stone, of the Air Force Office of Maintenance Engineering, insists that the management of maintenance *cannot* be "big business." In explanation of this seeming anomaly, he feels that the bigger the business the more streamlined and simple must be the management.

"Management must be a streamlined tool that can guide big business to operate in an efficient and effective manner with less and less overhead," Col. Stone said. "This must be the goal of management and it is the goal of maintenance management in the United States Air Force."

Col. Stone foresees additional expenditures for maintenance as the Air Force increases its missile and space activities.

"As we move along in the missile era," he said, "maintenance will become the whole show because we don't fly a missile every day. In the missile era, maintenance will probably consume 90 percent of the dollars other than new buy. The equipment that we must keep in combat-ready condition, consisting of aircraft, missiles, ground support equipment, warning systems and non-aeronautical equipment can be counted in multi-billion dollar figures."

Col. Stone readily concedes that "multi-billion dollar figures" constitute big business in almost any translation. His point, however, is that expenditures for the management of maintenance must not advance at the same pace.

"We in maintenance must have the utopia in management," he said. "Our management cannot grow with our dollar value. Maintenance management must be streamlined and must capitalize on all the advancements in sociology and technology in order to handle the ever increasing responsibilities."

The Air Force believes that it has found the answer in the application of the provisions of its manual, AFM 66-1, "Organizational and Field Maintenance." It is now the "bible" for maintenance management at organizational and field level throughout the Air Force. It establishes policy and procedures for the maintenance of aircraft, missiles and ground support equipment and may be extended to cover ground communications. It has standardized maintenance operations at more than 300 base level activities world-wide. It has been instrumental in formulating the philosophy of "management by exception."

Because of the extent of the resources that require maintenance management in the Air Force, Col. Stone said, direct management proved unfeasible and "management by exception" was adopted as basic policy. "We do not have each man account for his time directly," he explained. "Instead we credit him with all the time he is assigned (44 hours a week) and then account only for the time he is not performing those duties for which he is assigned."

As an example, Col. Stone cited the case of the electrician at a B-52 base. So long as the electrician is performing an electrician's duties either on the airplane or in the shop, he makes no time accounting. If he is required to be absent from duty to go to the hospital or on leave, or on alert, he accounts for this absent time. He also accounts for the time he is required to work in the tool crib or attend maintenance meetings.

The Use of ADP

The Air Force applies the same philosophy to the technical aspects of maintenance management. Referring again to the B-52, Col. Stone said:

"It would be humanly impossible to manage the entire technical aspects or the technical malfunctions of this one piece of equipment by attempting to analyze all of the malfunctions. Instead, we again manage by exception—that is, those malfunctions that are exceptionally important.

"This could be either a single malfunction involving safety-of-flight or a large number of malfunctions on a non-critical item. We attempt to look for those malfunctions which consume the largest number of man-hours and those which consume the most replacement time. Those systems which consume relatively few items or a small amount of manpower are omitted from management. We are realists, we have no choice."

The standardization of maintenance activities in the personnel and equip-

ment areas under AFM 66-1 enables the Air Force to record and massage information through the use of automatic data processing equipment. This information, in turn, enables analysis personnel to develop answers to questions such as:

What ratio of manpower is spent in supervision?

What system on the missile uses the most manpower?

What components are failing most of the time?

What causes aircraft to abort in flight?

What causes a labor force to be absent from work?

"The machine will only do the menial tasks of sorting and arithmetic," Col. Stone stresses. "The machine cannot think. It can only do what it is told to do. Depending on the questions of top management, the automatic data processing equipment reacts. We in maintenance manage by exception, manage the exceptional trends and problems and accept those of a minor nature. Top management must ask in detail what they want to know, the analysis man will analyze the data generated by the mechanic, supply the answers to top management and then decisions must be made to improve production."

Communications

In the Navy's Bureau of Weapons, one of the principal problems in maintenance management is faulty communications and another is the fact that nothing appears quite as permanent as change.

Maj. Richard A. Bauer, the Marine who heads up the Maintenance Programs Section, is the source of the comment on communications. His civilian co-worker, Jack Witten, chief of the Research and Analysis Section, is the man who has been convinced that change is here to stay.

It is extremely difficult to write instructions in terms that are readily understood by each individual who reads them, Maj. Bauer said, because the author usually assumes details which might not be apparent to the addressee. He recalled a recent message notifying the addressee that an airplane was scheduled for a test flight and that 15 maintenance actions had to be undertaken before the test took place. It required a follow-up message to spell out that the maintenance personnel were also responsible for actually conducting the flight test.

About one-half of the personnel in the Navy are engaged in maintenance of one form or another, Maj. Bauer estimates. To illustrate the scope of maintenance activities, he said that aircraft

maintenance alone in the Navy and Marine Corps costs about \$1 billion a year.

Supply and command data present no communications problem in the Navy, Maj. Bauer said, but the flow of technical information tends to be slow.

"We are geared to the command system rather than the technical information system," he said. "For instance, Polaris submarines know just where they are supposed to be and where they are supposed to go. But if a problem of excess radiation should arise on a Polaris submarine, definitive instructions for a solution might not be quite so readily available. It would be fine if the man in the field could make a call direct to the technical expert for advice. In the field, the platoon leader can call direct to battalion headquarters for instructions."

The cure as Maj. Bauer sees it lies in insistence by management that the user understand the documents he handles. Too many mechanics fail to read instructions and make proper reports because they dislike paper work. Some men neglect to check the oil gauge or tire pressure until the engine overheats or the tire is flat, many tend to abuse tools whether screw driver or check-out equipment worth half a million dollars.

"The answer rests with the people in authority," he said. "The only important thing is the tactical application of equipment. Maintenance requires cooperation and understanding. Responsible people should know the answers. We have some people with a highly developed sense of tunnel vision, it's almost a practiced art in some areas. They pay no attention to the firing on the right or the left and look only at their own particular bull's eye."

Design Changes

Mr. Witten agrees that communications constitutes a real problem in maintenance, but feels that design changes present an equally important challenge. The development process and the manufacturing process never cease, he said, and the "factory door" theory of a completed item of equipment is no longer valid. Deficiencies develop, he pointed out, and there is a constant effort to change configurations. These result in changes in the inspection process and this means changes in facilities. "We have to match the man who has the answer with the man who asks the question," he said.

The Bureau of Ships believes that it has the answers to most of the maintenance management questions in its FRAM program for Fleet Rehabilita-

tion and Modernization. Capt. T. C. Gurley, Assistant Chief for Fleet Maintenance, said the program is designed to extend the useful life of ships from five to ten years and costs about \$100 million annually divided about evenly between new equipment and repairs.

Capt. Gurley estimated that the grand total devoted to direct fleet maintenance comes close to \$500 million a year and about two-thirds of this amount comes from Bureau of Ships operating and maintenance funds. The Navy has more maintenance requirements than it has dollars, however, he said, and only the best ideas are incorporated into the program. Actual fleet maintenance is handled mostly at fleet level. The Bureau of Ships determines what has to be done and the naval shipyards do the actual job on a schedule arranged by the bureau to equalize the workloads at the various installations.

The Report System

The Bureau maintains a materiel failure reporting system and a ship failure or casualty report system which is required whenever the operational readiness of a ship is affected. These reports are compiled to identify individual failures and when they are found to be repetitive, corrective action is undertaken through the publication of general maintenance instructions.

The Navy's Bureau of Yards and Docks has been applying the principles of maintenance management to its shore establishment for the past five years and has compiled an impressive record of progress in this area. Rear Admiral E. J. Peltier, Chief of the Bureau, who is spear-heading the management program, estimates that it costs the Navy almost \$500 million a year to maintain and operate its shore establishment world-wide.

During the period from 1955 through 1960, the Bureau has been able to maintain a virtually constant level of maintenance with an almost level budget even though the replacement value of the establishment has increased from \$15.1 billion in 1955 to \$20.1 billion in 1960. During the same period, the purchasing power of the Bureau's maintenance dollar decreased from \$1.00 to 83 cents and the overall maintenance forces declined from 51,000 to 41,300.

In terms of labor potential, the Bureau reported that the percentage of the working day which the workman could devote to direct maintenance productivity in 1955 was 36 percent whereas by 1960 planned maintenance practices raised this figure to 46 percent. Admiral Peltier's target is 65 percent by 1965.

In the conservation of utilities, the Bureau reduced costs by \$10 million for the five year period and expects to reach a \$14 million reduction in this area. Improvements in transportation management reduced the inventory from 41,000 pieces of equipment to 34,000 pieces in five years and increased utilization from 6,500 to 8,500 miles per vehicle per year.

The Navy estimates that the value of the Naval Shore Establishment plant equals the combined value of the comparable plant of three of the country's largest companies—General Motors, Standard Oil of New Jersey, and the Ford Motor Company.

Included in this Navy plant are almost 100,000 buildings, about five million acres of land (the size of the state of New Jersey), 2,500 miles of railroad tracks, 130 miles of piers and wharves, 200-million yards of pavement for roads and aircraft facilities, 19-million cubic feet of cold storage space, 5,500 items of railroad equipment, and 4,000 miles of sewer lines. There are more than 15,000 boilers under fire. Electric consumption accounts for 1/200th of the nation's entire output.

Highly Diversified

The plant is also highly diversified. It includes educational, training and research and development facilities; housing and hospital facilities; ship and aircraft repair facilities, and industrial, commercial and warehousing facilities.

To illustrate the need for maximum utilization of the maintenance dollar in management, the Bureau cites the mundane operation of trash and garbage disposal. If one cent could be saved on each cubic yard, it would mount up to a total of \$150,000 a year.

"The need for proper management becomes more important," Admiral Peltier points out, "when it is realized that for the foreseeable future we must live on a level defense budget. This means that such an unglamorous item as maintenance must give way—and rightly so—to our operating forces and the new sophisticated and expensive weapons these operating forces must have. Therefore, maintenance can look forward to less, rather than more, operating funds."

"Maximum utilization of funds is the objective of the Navy's Public Works Maintenance Management programs. By adopting the principles of Industrial Engineering, and adapting to maintenance the industrial engineering techniques, proven so satisfactory in manufacturing production, we strive to get full value for each Navy maintenance dollar spent." ■

Civil Service Goal: Stronger Management Program

Chairman John W. Macy asks AFMA to support White House plans for career service leadership, sees strengthening of system in conference address. Text follows:

TWO years ago I had the privilege of appearing before the Armed Forces Management Association in my recently acquired academic attire. Cloaked in such immunity, I raised a number of questions concerning the capability of defense management to master vital missions in the face of the swift movement of events. "The Collapse of Time" produced by technology, I claimed, prompted a greater sense of urgency and extended effort to generate much greater management capacity.

But today my involvement is not academic but critically real; as the new chairman of the Civil Service Commission I am pledged to join you in a creative supporting role as you seek solutions to management problems of vast importance and magnitude. My garb has changed but not my message: An even greater urgency calls for an even greater capacity.

The very multiplicity and size of these problems tend to defy our understanding. The traditional approaches to solutions frequently lead to frustration or defeatism. The call for new ideas is the needed response. A willingness to recognize the ever-present complexity with which we must live in national-security management will provide an initial step toward solution. I am convinced that there are enough positive factors at work to permit us to come to decisive grips with the most persistent management problems. May we join forces to promote the application of these factors.

Back in 1959 on the college campus I read those articles in *ARMED FORCES MANAGEMENT* about the Civil Service Bogeyman with detached depression and puzzlement. Today in talking with you about strengthening the Civil Service System I review those condemnations as a direct challenge to action—with your support rather than your editorials. Let's put J. K. Stonewall to work; his firepower can be directed toward a more significant target. From my experience in both the Defense Department and the Commission, I am convinced that through joint action the System can be an affirmative

framework for management rather than a whipping boy or bogeyman.

I was gratified to find in the lobby of the ancient Civil Service Commission building, upon my return a few weeks ago, a very large exhibit proclaiming the role of the Federal Civil Service as "a vital link in our Nation's defense chain." I believe this constitutes the proper symbol and, by demonstrating visible and tangible awareness of the civilian's commitment to the defense mission, augurs well for a profitable partnership in the days to come.

On the other hand, if there are system spectres to contend with, I suggest we use the traditional method of dispelling such will-o'-the-wisps and shine a bright light into any dark closets that we can discover. Surely this method would be a practical first step toward exercising any of these creatures that haunt our activities.

Much is being said and written these days about the change in political climate and the new spirit and the new tempo in Washington. This climate is one of the big factors in our favor as we meet the management challenge of the Sixties. The President has spoken many times about new frontiers and new horizons, and, by his words in such historic statements as the State of the Union message, has put the spotlight on the Government's career service as never before. He has called for "proud and lively" careers, for "healthy controversy," for "daring and dissent," and for "initiative, responsibility, and energy in serving the public interest."

Those of us who are concerned with the management of the great enterprises of Government must ask ourselves in all candor whether we are tuned to this wavelength. Are we responding to the Chief Executive's challenge as seasoned and mature professionals in the business of management, or are some of us suffering a kind of managerial hangover? The President's words have been a call for action, and we cannot be content with an organizational attitude which regards management as a holding action. We must all ask ourselves whether we have

developed and presented to the appropriate people in our organizations any bold new plans or suggestions in response to the President's call. Or whether we have called attention to any untended horizons.

It is, of course, the function of the new administration team to provide leadership and show the way. But in response to that leadership, we should be seeing in the career service a ground swell of impatience to get on the move, to plough new management territory, and to raise public administration to higher levels than ever before attained. This is the implication of the "full partnership" which the President has said he wishes to see between the career service and his administration team. Every career employee must bear his share of the responsibility for making this partnership a reality.

This administration recognizes clearly—and this is something we can be grateful for—that the career service is not a large, amorphous mass of drones to be pushed in one direction or another. The elements of leadership within the career service itself are to be put to full use. Therefore, the career employee with his experience, and his command of the facts, must do more than ask for leadership. He must help provide it.

Now for some other heartening factors that are in our favor. I have been mightily impressed by the development of training in the Federal service that has taken place since the enactment of the Training Act of 1958. Training is one of our major allies in combating complacency and standpatism and in assuring responsiveness of our civilian establishment to current and anticipated needs of the service. But I am by no means satisfied that we cannot extend the value of training further by applying a little additional thrust. Also, there is a horizon beyond the Training Act of 1958, and we can't wait another 10 years to reach it. The case for an administrative staff college, for example, has been effectively stated and argued many times in the past years. Now it is time to consider ways

(Continued on page 30)

ARMED FORCES MANAGEMENT



Hear this . . . Somewhere under the seven seas, part of the Navy's nuclear deterrent force is on station. Aboard the Polaris submarine George Washington command communications equipment stands ready for operation. This equipment was developed by Avco. Highly skilled scientists and engineers of Avco's new Undersea Projects Office are working on antisubmarine warfare problems and research on related underwater phenomena.

Avco

Research & Advanced Development

AVCO CORPORATION, RESEARCH AND ADVANCED DEVELOPMENT DIVISION, WILMINGTON, MASS.

APRIL 1961

UNUSUAL CAREER OPPORTUNITIES FOR QUALIFIED SCIENTISTS AND ENGINEERS . . . WRITE AVCO TODAY.

Civil Service Goal

(Continued from page 28)

we can push this project to fruition; but it is still going to require a lot of interpretation, illustration, and justification to get this project off the back burner.

There have been effective steps taken recently in the field of executive development. The Government-wide roster of career executives—just assembled by the Commission—has great potential, because it will enable us to assess, for the first time, the composition of the top career staff in the executive branch. Furthermore, we can be of direct assistance to agency heads in filling top assignments, on a continuing or "spot needs" basis, with carefully selected, experienced executives. We can know, in effect, what our top manpower resources consist of, where they need to be supplemented, and whether we are committing these resources to the right place at the right time. In the course of developing the roster we have learned much about the characteristics of this top staff group, and this information has many implications in terms of training and development, staffing, and mobility of top people. You will be hearing more from us on this.

Another factor in our favor is the increased realization of the potential of Automatic Data Processing as a management tool. ADP was not exactly dormant in the late Fifties, to be sure, but now we find a fantastically increased interest. ADP seminars are heavily oversubscribed. Computer installations are multiplying like rabbits. Why, to be against ADP today is like being against motherhood. All this is to the good, but even ADP has its limitations. Before getting into these, however, I would like to qualify myself as a member of the fraternity. Let anyone think I am hesitant about computers, the Civil Service Commission has one, and has an ADP program I am backing to the hilt.

Now, what is the significance of the present rage for ADP? Certainly the automation of clerical tasks and the production of data for better management decision-making, data that were inconceivable a few years ago, are evident to everyone. But isn't there more than this? Aren't we witnessing a large-scale assault on management problems which has been triggered by ADP? It is the sheer magnitude of this assault which impresses the newcomer. The human beings who are attempting the solution of these problems today are still *homo sapiens*; their analytical techniques do not appear so radically changed when you think about them awhile.

The essentially different elements are their objective and their motivation. The objective of doing it with a computer is obviously different. The element of motivation may not be so well recognized. What accounts for this extreme motivation? Is it desire for the thrill of getting a program on the air? Is it the pressure of knowing you either deliver the goods in measureable terms or you don't? Is it the need to demonstrate an ability to do as well as others—again in measureable terms? Whatever the reasons, and I suspect they vary from individual to individual, strong motivation is evident. The newcomer is struck by a hope that the benefits of this motivation will be fully tapped. If we can agree that automation is not the answer to all management problems, that everything studied cannot be automated, I believe we find two more challenges for better management in the Sixties.

The first one is simply stated. The many studies initiated in the name of automation can, and do, turn up opportunities for management improvement which have no relationship to ADP. Even when a feasibility study proves how silly automation would be, we frequently find the basis for improvement in the manual or mechanized systems already in being. Capitalizing on these opportunities, in other words assuring that we reap the full benefit of this unprecedented assault upon management problems, appears as a must for better management in the Sixties.

Second Challenge

The second challenge deals with the possibility of letting the siren song of ADP draw us to the shipwreck of our overall management effort. Like Ulysses, we must hear her song and respond, but if we begin to feel like going overboard, we had better lash ourselves to the mast with thongs of commonsense. The newcomer could ask if some of us haven't already become blind to the good old-fashioned management techniques which produced important management improvements in the pre-automation days. Can we distinguish between the kind of gains which can be made with or without the use of ADP? Or do we have only a blurred picture of the techniques which proved so effective before automation revolutionized management thinking? Regaining or maintaining true focus looks like a first-rate management challenge for the Sixties.

Maintaining true focus also means keeping a clear eye on all resources, human as well as computer, and this brings me to the last of the challenges to be mentioned in connection with ADP. It is my contention that the human brain is one of the best and

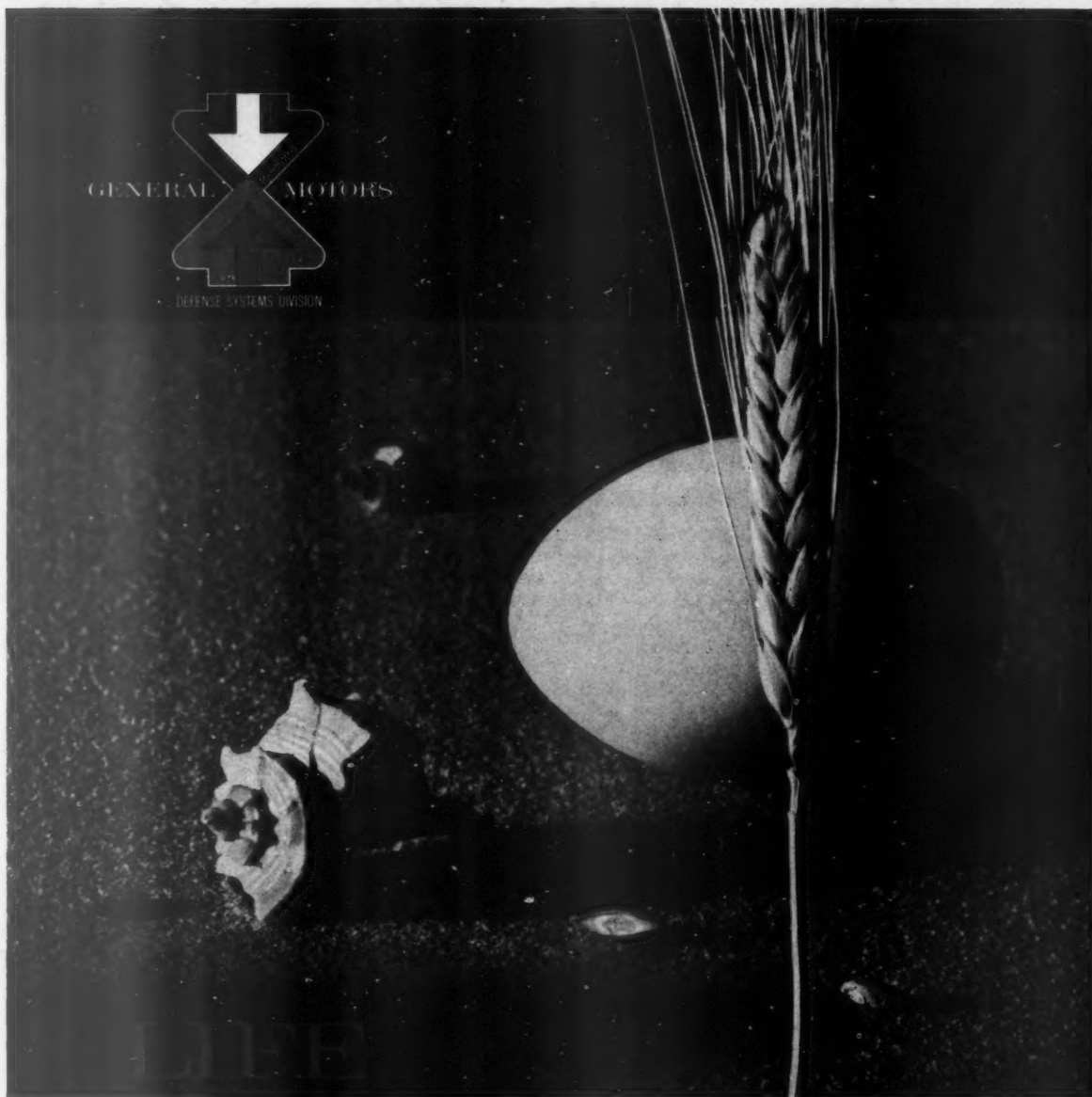
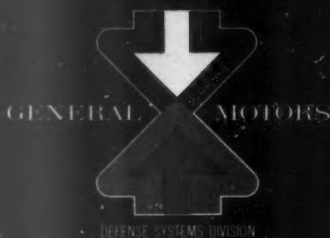
cheapest little computers in existence. It is highly flexible and self-programming. It can cope with the unforeseen. Of course, for repetitive, big-volume jobs it is slow. But when non-volume, or non-repetitive operations are being performed, each of which would require a separate written program, where else can you buy a self-programming computer for three to five dollars an hour? As General Lemnitzer has stated: "The human being is today the only computer that is produced by unskilled labor."

The Human Element

Cost is not the only consideration, of course. It is quite apparent that the human element becomes increasingly critical in the successful utilization of ADP. More highly skilled managers who can analyze and respond promptly to a greater variety of more timely data are already at a premium. It is good to keep in mind, however, that skilled managers were in short supply before ADP, which is merely heightening the complexity of our management environment. With Federal expenditures for ADP exceeding a half billion dollars per year, we must wonder if the selection, training, and utilization of people who work with machines and their products will receive attention commensurate with the machine challenge.

But, of course, the improved and extended use of machines is only one part in a total effort to strengthen the system. We must call for high standards of individual performance, for the creation of a management climate where imagination and innovation may flourish; for supervision determined to increase production, develop new techniques, and reduce staff; for managers committed to healthy change to achieve new missions, and for general willingness to detect weakness and to propose and work for correction. Human management should be the master of the system, not its defeated victim.

In summary, I know that our dedicated, capable, and resourceful career service will respond to the challenges of a new political climate. Knowledge of the composition of that service provides ample confidence that the leadership responsibilities will be met in these crucially important Sixties. I am equally confident that as we take a balanced approach to automated operations, we will assure wise utilization of our precious human resource; this must remain a constant goal for Federal managers in the Sixties. Without minimizing the difficulties and the effort all this will take, I look forward to the strengthening of the career service, and to greater achievements, with practical optimism. ■



...the essence of the challenge

Today an exceptional group of scientists and engineers are pooling their specialized wisdom and genius in a race with tomorrow. These are the men of the General Motors Defense Systems Division located in Warren, Michigan and Santa Barbara, California.

ASSIGNMENT . . . Anticipate and prepare for the ultimate problem of mankind—survival . . . in peace and in war . . . survival on land, on and under the sea, in the air and to the farthest attainable reaches of outer space.

This assignment serves . . . and is served by . . . virtually every current and future field of scientific learning. It serves . . . and is served by . . . every segment of industry and government. It reaches out to a horizon as yet unknown—unexplored.

Already these men are actively at work in sea and land operations, aero-space, astrophysics, biological sciences . . . meshing their skills and ideas in America's forward movement.

Defense Systems Division will manufacture no products in volume. Rather, DSD will serve the Defense Department and other governmental agencies, in cooperation with industry and other scientific groups, in fields of fundamental research and engineering through the coordination of knowledge, abilities, ideas and hard work.

General Motors is proud to contribute, through the Defense Systems Division, to the strength of America and human progress. Top-level scientists and engineers in all of these specialized fields will find rare opportunities and challenging assignments in this fast-growing organization.

DEFENSE SYSTEMS DIVISION, GENERAL MOTORS CORPORATION, WARREN, MICHIGAN AND SANTA BARBARA, CALIFORNIA

ARMA

PRODUCING ALL-INERTIAL GUIDANCE FOR ATLAS

Many successful full-range test flights have proved the reliability and accuracy of the Arma inertial guidance system now in full production. Other advantages—salvo firing, immunity to jamming, low cost, a minimum of ground support equipment—are inherent in inertial guidance. Currently at Arma, company-funded research programs are studying smaller, super-sensitive devices for navigation and satellite instrumentation.

ARMA, Garden City, New York, a division of American Bosch Arma Corporation . . . the future is our business.



AMERICAN BOSCH ARMA CORPORATION

ARMED FORCES MANAGEMENT

New Defense Team . . . Chart pgs. 34-35

Robert S. McNamara, Secretary of Defense, 44, noted for professorship at Harvard School of Business and experience at running mammoth enterprise. One of ten "Whiz Kids" who sold themselves as a team to Ford Motor Company in '46 after Army Air Forces duty in WW II, was also first non-Ford to ever head the nation's second largest auto firm. Prior to AAF duty, consultant to War Department in installation of statistical control system for Army Air Corps.

Roswell L. Gilpatric, Deputy Secretary of Defense, 54, expert in organization and Defense Department contracting. No newcomer to the Pentagon, was Air Force Assistant Secretary '51, Under Secretary '53, on Rockefeller Studies Project for Defense Reorganization '56-57, and on Symington's Committee on the Defense Establishment in '60.

Cyrus R. Vance, General Counsel, 43, former Navy destroyer man, served two years ('57-'58) as Special Counsel to Preparedness Investigating Subcommittee of the Committee on Armed Services of the United States Senate during inquiries into satellite and missile programs. Served two more years as Special Counsel to Preparedness Investigating Committee. Consulting Counsel for Special Committee on Space and Astronautics of the U.S. Senate.

Thomas D. Morris, Assistant Secretary of Defense (Logistics and Installations), 47, an old hand around Defense Department, served in both Defense Department and Bureau of the Budget, last as Assistant Director of Budget Bureau for Management and Organization. Served in Navy during WW II, later worked as consultant with both Hoover Commissions. Served as Deputy Assistant Secretary of Defense (Supply and Logistics) '56-'57.

Paul H. Nitze, Assistant Secretary of Defense (International Security Affairs), 54, Republican turned Democrat after Republican senators blocked his appointment to his present job in Eisenhower Administration. Reason: claimed he was too liberal in his thinking. During Truman Administration, was instrumental in shaping Marshall Plan and later became Director of State Department's policy-planning staff.

Carlisle P. Runge, Assistant Secretary of Defense (Manpower), 42, former Professor of Law at University of Wisconsin Law School, his alma mater. During last year headed University's Special Committee on ROTC. Was Deputy Chairman of Wisconsin Legislative Council on War Emergency Legislation '58-'59. Is Commander of 32nd Infantry Division Trains, Wisconsin Army National Guard.

Dr. Harold Brown, 33, picked to relieve Dr. Herbert York as Director, Defense Research and Engineering. Brown will be youngest man on McNamara's immediate staff. Specialties include nuclear physics, nuclear reactor design, nuclear fissions and weapon systems. In new post, will choose among rival weapon systems advanced by services. Since '58 has been consultant and advisor on nuclear matters to Government and large industries.

Arthur Sylvester, Assistant Secretary of Defense (Public Affairs), 59, will be valuable man to newcomer McNamara. Is considered "old pro" around Washington (has been Washington Bureau Chief of Newark Daily News since '44). Will work closely with new White House Press Secretary Pierre Salinger. Joined Newark News in '24, moved up to Assistant City Editor in '29, after other assignments was appointed City Editor in '36. Next step: Washington.

Charles J. Hitch, Assistant Secretary of Defense (Comptroller), 51, author of "The Economics of Defense in the Nuclear Age." Will supervise and direct preparation of DOD budget estimates. Graduated University of Arizona '31, took one year graduate work at Harvard and attended

Oxford University as Rhodes scholar in '32. Once served as Chief, Controls Division, Office of War Mobilization and Reconversion.

Herbert B. Loper, Assistant to the Secretary of Defense (Atomic Energy), 64, Chairman of Military Liaison Committee to the Atomic Energy Commission, holdover from Eisenhower Administration, was appointed in July, '54. Served as Consultant for AEC, Assistant Secretary of Defense (Properties and Installations), and Special Consultant to Secretary of Defense.

General Graves B. Erskine, USMCR (Ret.), Assistant to the Secretary of Defense (Special Operations), 63, holdover from Eisenhower Administration. Appointed in June, '53 after completing 37 years commissioned service in Marine Corps. Served in Washington in '45 as Administrator of Retraining and Reemployment Administration (for returning WW II soldiers). Also headed ('50) Joint State-Defense Mutual Defense Assistance Program Survey Mission to Southeast Asia.

Norman S. Paul, Assistant to the Secretary of Defense (Legislative Affairs), 41, staffer ('48) of Economic Cooperation Administration, later became Deputy Assistant to the Administrator for International Security Affairs. Was Program Advisor in Office of the Director for Mutual Security '52, Regional Director for Near East, Africa and South Asia and Deputy Director of FOA for Congressional Relations. From '55-'60 was with CIA.

Elvis J. Stahr, Jr., Secretary of the Army, 44, Kentuckian who was graduated from his home state college ('36) with highest grades ever recorded there. Holds three degrees. During Korean War was Special Assistant for Reserve Affairs to (then) Secretary of the Army Frank Pace, Jr. Named Associate Professor of Law at University of Kentucky ('47) and at age 32 was appointed Dean ('48), became President of West Virginia University in '59.

John Connally, Secretary of the Navy, 43, University of Texas graduate and long time campaign aide to Lyndon B. Johnson, as well as wheeling and dealing Texas lawyer. Former Navy man, won Bronze Star and Legion of Merit while fighter plane director aboard carriers Essex and Bennington during WW II. Served as Administrative Assistant to Vice President Johnson. Gave up flourishing Fort Worth law practice to take present post.

Eugene M. Zuckert, Secretary of the Air Force, 49, top-notch man in contracts and contract management, onetime Assistant Secretary of the Air Force under (then) Secretary of the Air Force Stuart Symington. Like Symington, is an advocate of Defense Department unification. A man with a head for military contracts and management, served in Surplus Property Administration and, during Truman Administration, with Atomic Energy Commission.

Vice Admiral Laurence H. Frost, USN, Director, National Security Agency, 58, graduated Annapolis '26, served periodically in Navy communications billets throughout career. Was Head, Intelligence Estimates Division, Office of CNO in '49, Chief of Staff, NSA Directorate '53 and Assistant CNO for Intelligence in '56-'57. Assumed present duties in November, '60. Highly respected for knowledge in intelligence and communications.

Composition of the Joint Chiefs of Staff remains unchanged: General Lyman L. Lemnitzer, USA, Chairman; General George H. Decker, USA; Admiral Arleigh Burke, USN; General Thomas D. White, USAF, and General David M. Shoup, USMC. (See Armed Forces Management, November, 1960).

DEPARTMENT OF DEFENSE

ASSISTANT SECRETARIES OF DEFENSE



Cyrus R. Vance
**GENERAL
COUNSEL**



Thomas D. Morris
**LOGISTICS &
INSTALLATIONS**



Paul H. Nitze
**INTERNATIONAL
SECURITY AFFAIRS**



Robert S. McNamara
**SECRETARY OF
DEFENSE**



Roswell Gilpatric
**DEPUTY
SECRETARY OF
DEFENSE**

ASSISTANTS TO THE SECRETARY



Herbert B. Loper
**ATOMIC
ENERGY**



Gen. G. B. Erskine
**SPECIAL
OPERATIONS**



Norman S. Paul
**LEGISLATIVE
AFFAIRS**

JOINT CHIEFS OF STAFF



Gen. Lyman
Lemnitzer,
Chairman



Gen. George H.
Decker



Gen. Thomas D.
White

ARMED FORCES POLICY COUNCIL

Secretary of Defense,
Chairman; Deputy
Secretary of Defense;
Service Secretaries;
Joint Chiefs of Staff;
Director, Defense R&E

JOINT SECRETARIES

Secretary of Defense,
Chairman; Deputy
Secretary of Defense;
Secretaries, Military
Departments



Carlisle Runge
MANPOWER



Harold Brown
Director
**DEFENSE
RESEARCH
AND
ENGINEERING**



Arthur Sylvester
**PUBLIC
AFFAIRS**



Charles J. Hitch
COMPTROLLER



Elvis J. Stahr, Jr.
**SECRETARY OF
THE ARMY**



John B. Connally
**SECRETARY OF
THE NAVY**



Eugene M. Zuckert
**SECRETARY OF
THE AIR FORCE**



Adm. Arleigh
Burke



Gen. David
Shoup

**THE JOINT
STAFF**

**ALASKAN
COMMAND**

**ATLANTIC
COMMAND**

**CARIBBEAN
COMMAND**

**CONTINENTAL
AIR DEFENSE
COMMAND**

**EASTERN
ATLANTIC AND
MEDITERRANEAN
COMMAND**

**EUROPEAN
COMMAND**

**PACIFIC
COMMAND**

**STRATEGIC AIR
COMMAND**



VAdm. Laurence Frost
Director
**NATIONAL
SECURITY
AGENCY**

Monsanto

Space-Age Project "SUPER THRUST"

A CHEMICAL EXPEDITION..



Monsanto
in the
next
the
sion
hydro
gine
the

1200
1000
800
of
600
400
200

...exploring hydrocarbons for High-Mach fuels... seeking new paths to heat stability

Monsanto research is making significant strides forward in the search for heat-stable hydrocarbon fuels for the next generation of jet engines. Working under contract with the propulsion laboratory, Wright Air Development Division, Monsanto chemists are blocking out a variety of hydrocarbon compounds for fuels "task-tailored" to engine design requirements. These fuels promise to meet the three most pressing fuel requirements:

High thermal stability
High energy per unit of weight and volume
Optimum heat-transfer capability

To meet stringent fuel requirements as they become more closely defined for advanced jet engines, Monsanto has screened some 6,000 chemical compounds. More than fifty hydrocarbons have been selected for intensive evaluation based on their promising physical properties.

From the exhaustive search and confirming experimentation, Monsanto research has determined that a hydrocarbon fuel is within reasonable reach that will not decompose or "gum" in the 600°-800° F. range. Its high heat stability will enable it to serve as the heat sink... essential in advanced-design jets to relieve the lubricant, engine components, thrust chamber and "skin" from heat stresses.

IMPROVED DUAL-PURPOSE FUEL: ENERGY AND HEAT SINK, HEAT STABLE, SUPER THRUST

From current study, it appears that the compound with optimum jet fuel properties may turn out to be either a relatively simple mixture of highly "pure" cyclic, saturated chemicals or narrowly selected fractions of refinery streams, hydrogenated to saturation and carefully separated. This necessarily would be a

chemically made fuel, not a run-of-refinery mixture. As such, it would provide more closely defined physical and chemical properties for predictably uniform performance.

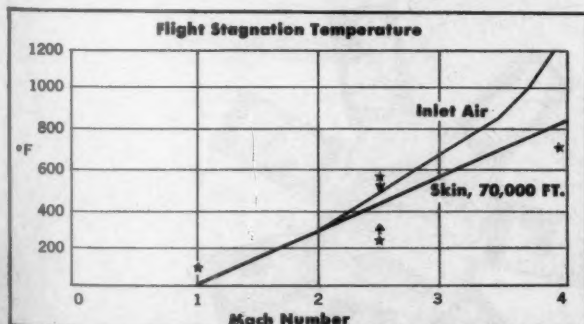
Its requirement parameters are becoming fairly clear: BTU's per pound—18,500 to 19,000 minimum; specific gravity—0.85 to 0.95 (or heavier); no coking or "gumming" to 800° F. In addition to heat stability, next-generation jet fuels must have maximum heat of combustion (on a weight-and-volume basis) to increase the jet craft range.

Monsanto is in an unusually sound position to help engine makers and the military in solving the fuel problem. Its Special Projects Laboratories are staffed and oriented for precisely this type of research. In addition, Monsanto's Organic Chemicals Division has a basic position in aromatic compounds. Through its Lion Oil Division, Monsanto has a basic supplier position in refinery products (and the research facilities) to study the possibilities in paraffins, naphthenes and close cuts of refinery streams.

Several candidate fuels have already been prepared and manufactured in evaluation quantities; for example, isopropylbicyclohexyl. Study is continuing in many other areas, including both naphthenes and paraffins. Most important, with a variety of "candidates" Monsanto next needs to know specifications based on design: the density limits, exact heat stresses, minimum thrust limit. With these parameters "jelled," Monsanto can guide the engine maker to a variety of candidate cyclic or paraffinic hydrocarbons for evaluation.

ENDOTHERMIC-REACTION FUELS— ANOTHER AVENUE TO "SUPER THRUST"

Chemically, there is little chance that a saturated hydrocarbon fuel stable above 900° F. will be found.



At subsonic speeds, engine heat can be dissipated by convection to the air. At speeds higher than Mach 1.4, the rate of air cooling reaches borderline; at High-Mach speeds, air cooling is inadequate. The frictional heat of aerodynamic drag and the reject heat of

Approximate cooling requirements:		
Mach Number	HEAT SINK, BTU/lb. of Fuel Required Available JP-4 †	
1.0	★ 130	170
2.5	★ 220-550	170
4.0	★ 725	170

† Conventional liquid jet fuel heated from 100-400° F

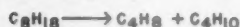
engine combustion must be dissipated to some part of the vehicle or its load. Conventional liquid JP-4 fuel, a refinery stream hydrocarbon cut, reaches its borderline limits of heat stability near speeds of Mach 2.5. Fuels having higher limits of heat stability are required.

(Please turn page)

However, a fuel system may be developed—with compounds capable of undergoing endothermic reactions—that will operate in environments in the 1200-1900° F. temperature range. Basically, this requires the development of a compound to be converted *in flight* to the actual fuel, in a "package" chemical converter that would utilize part of both the reject heat of fuel burning and the friction heat of aerodynamic drag. Endothermic fuels show promise of increasing vehicle range through greater fuel efficiency, since heat energy normally lost is absorbed during the endothermic conversion and released during combustion. A few of the promising possibilities programmed for experimentation:

THERMAL CRACKING OF HYDROCARBONS:

Cracking:



Heat Absorbed: 370 BTU/lb.

DEPOLYMERIZATION TO OLEFINS:

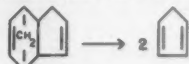
Diisobutylene



Heat Absorbed: 390 BTU/lb.

RETRODIENE SCISSION:

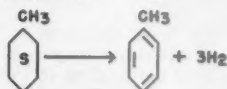
Monomerization of dicyclopentadiene



Heat Absorbed: 310 BTU/lb.

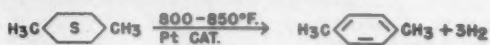
DEHYDROGENATION AND AROMATIZATION:

Dehydrogenation of 6-membered naphthene to an aromatic



Heat Absorbed: 900 BTU/lb.

STABILIZED HIGH-TEMPERATURE FREE RADICALS (Series Reaction):



Total Heat Absorption (sensible heat plus heat of reaction): 3980 BTU/lb.

Monsanto research has blocked out several more "types" of endothermic reaction, each with dozens of specific compositions, as promising starting points for heat-sink fuels to power supersonic craft.

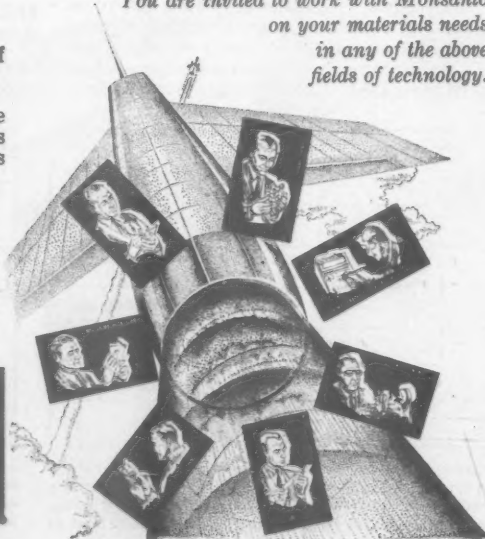
CHEMICAL FUELS—ANOTHER CHEMICAL CAPABILITY OF MONSANTO

Where design and fuel performance are interdependent, you are invited to enlist Monsanto's capability on the chemistry of the fuel. Write or call: MONSANTO CHEMICAL COMPANY, Department AM-2, C Building, St. Louis 66, Missouri.

Monsanto Space-Age Projects for Government and Industry

- * High-Temperature Hydraulic Fluids
- * Coolant-Dielectrics for Electronic Equipment
- * High-Temperature Plastics
- * Improved Nitrogen Oxidizers for Solid Propellants
- * Fire-Resistant Structural Plastics
- * Hydrocarbon Fuels for Jets and Missiles
- * Fire-Resistant Hydraulic Fluids for Ground-Support and Missile-Launching Equipment
- * Radiation-Resistant Heat-Transfer Fluids
- * High-Temperature Lubricants and Additives
- * Radiation-Resistant Reactor Coolant-Moderators
- * Intermetallic Semiconductor Materials
- * Pure Silicon for Transistors, Rectifiers, Diodes
- * Ultra-Fine Metal Oxides
- * Materials for Vibration Damping
- * Heat-Resistant Resins for Laminating and Bonding
- * Inorganic Polymers
- * High-Energy Solid Propellants

You are invited to work with Monsanto on your materials needs in any of the above fields of technology.

ARMED FORCES MANAGEMENT



Research Rundown

Decision Tests McNamara Policy

Defense Secretary McNamara's directive awarding the lion's share of space research and development responsibility to the Air Force got rough treatment from the other services when it was in the proposal stage. This was to be expected, however, in view of McNamara's initial policy announcement that he expected "full and open discussion *within the department* by all the leaders of the department, military and civilian, without regard to whether their views conform to those of others in the department, including my own." Even rougher treatment of the directive on Capitol Hill is also covered by the McNamara guide-lines. "I do *not* mean," he said, "that they (Defense officials) should not express their opinions, particularly their disagreements, relating to policies, if queried by appropriate agencies of Congress; there are additional provisions provided for in the Reorganization Act which permit the service secretaries, the three service secretaries, and the Joint Chiefs, to report to appropriate Congressional agencies their disagreement with specific policies of the Defense Department if, in their opinion, those policies do not permit them to carry out their responsibilities."

Machines vs. Muscle

Elimination of stenographers and typists by a machine that will transcribe the spoken word into finished typing is not only possible but feasible. Spokesmen for the Air Force Administrative Services say the machine will be ready for demonstration within a year or so. Already in operation, they point out, is a scanning machine which converts typewritten pages into tape for electrical transmission over existing communications networks.

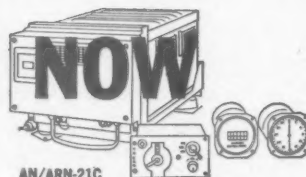
Navy Study Shows Skilled Help Increasing

Personnel research in the Navy Supply System has confirmed industry findings indicating increased requirements for skilled administrative and technical personnel and decreased requirements for clerical employees. The Navy study showed that in the Bureau of Supplies and Accounts clerical grades one through four dropped during the past five years from 17,000 to 8,000 and grades 11 through 16 increased from 846 to 1,794 over the same period. In line with this trend, the Bureau is placing additional emphasis on personnel selection, educational programs and promotion requirements. As a companion measure, the Bureau has launched a Methods Engineering Program designed to apply work measurement techniques of management and industrial engineers to the Bureau's overhead and supporting functions. The program will be extended to all of the Bureau's installations, will affect some 30,000 personnel world-wide and will require two and a half years for full initial coverage.


Horwitz Group Completes First Study—Others On the Way

Solis Horwitz, the Pittsburgh lawyer who directs the new Office of Organization and Management Planning, is the author of the Air Force "magna charta" for Defense space research responsibility which bears the McNamara seal. The Horwitz group was set up within the Office of the Defense General Counsel "to conduct research and provide solutions to Defense management and organizational problems." The directive on military space research was the first of a series of solutions designed to provide more efficient and economical operation and eliminate duplication of effort in the Defense Department. Another area which may be subject to Horwitz scrutiny: extension of the single manager procurement concept to include further standardization of supply items and elimination of duplication of inventories.

THE ONLY TACAN TO MEET AGREE* RELIABILITY REQUIREMENTS IS NOW CUSTOM-PACKAGED



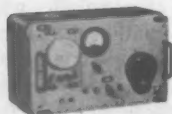
AN/ARN-21C

FOR
F-104  **B-58**



Hoffman test equipment checks TACAN accuracy — on the bench or in the cockpit

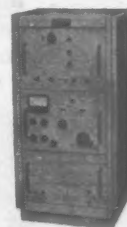
* Defense Department's
Advisory Group on
Reliability of Elec-
tronic Equipment



Hoffman specialized test equipment checks function and accuracy on the ground — before a flight or after repair. Compact and rugged Hoffman simulators can be carried and installed as standard test gear to every operating site or repair station — military, commercial, government or private installations. Write for further details.

HLI-119 TACAN TEST INSTRUMENT. Portable unit tests accuracy of all airborne TACAN in the cockpit of aircraft on the ramp or carrier deck. Checks accuracy of range and bearing at pre-set points and identification signals.

HLI-103 BEACON SIMULATOR duplicates all functions of the AN/URN-3 surface beacon. Tests for full azimuth and entire range, closure and departure speeds, surface beacon identity tone and decoding functions. For bench test or cockpit check.



Hoffman TACAN, standard air navigation equipment for USAF and NATO Nations, is systems engineered for greater reliability, improved performance and lower cost—now available in new TACAN "65" family!

Back in 1952, Hoffman began manufacturing TACAN equipment for the military. In 1958 Hoffman was selected by the Air Force to redesign and produce an improved version of the AN/ARN-21 which would meet AGREE specs. Hoffman met the challenge head-on and became the first manufacturer to deliver major electronic equipment meeting AGREE requirements. Result — MTBF was raised from 17½ to 150 hours, increasing reliability by 800% — and guaranteeing a 97.3% mission success probability! Performance characteristics upgraded, weight reduced 25% — and the total maintenance cost, over a 2000-hour life, reduced to just 15% of the original cost for field service and repair!

This same proven system has been repackaged for F-104, B-58, T-38, N-156F and XB-70 airplanes. All the superior advantages of the ARN-21C system, plus the advanced features of the new TACAN "65" family are available now in three new configurations. Bonus features provide time-and-money benefits for the user... and taxpayer, too.

**Hoffman
TACAN "65"
(AN/ARN-65V)
PLUS FEATURES**

In addition to standard features of TACAN ARN-21C:

- ★ Fits all previous aircraft circuitry
- ★ Twelve interchangeable modules within ARN-65(V) family
- ★ 58% replacement parts interchangeable with AF standard TACAN, ARN-21C
- ★ Understood by military maintenance personnel already trained in AR/ARN-21 service
- ★ Compatible with existing TACAN test equipment
- ★ Built-in cooling system — operates at 70,000 ft. without pressurization

OPTIONAL

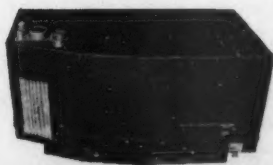
- ★ 300-mile range
- ★ Air-to-air ranging
- ★ Bi-Directional Search

PLUS

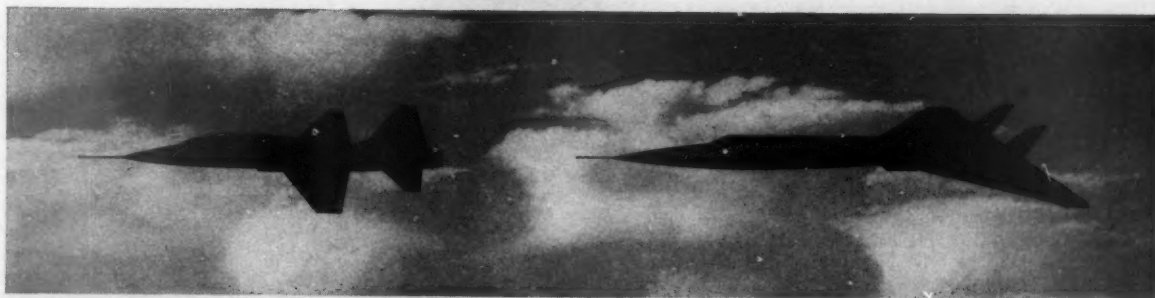
- ★ Transistorized regulated power supply
- ★ 126 Crystal RF System to reduce spurious outputs
- ★ Tracking frequency multiplier to use 126 crystal system
- ★ Low-pass antenna filter to eliminate harmonic responses of its preselector and the transmitter signal
- ★ Incorporation of high altitude designs for full power operation

SOLID STATE TECHNIQUES UTILIZED

T-38

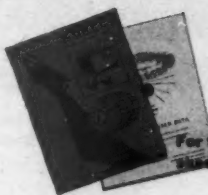


XB-70 AIRCRAFT



Hoffman / ELECTRONICS CORPORATION
Military Products Division

3740 S. Grand Avenue, Los Angeles 7, California • Richmond 7-4480



For the full story, send for new TACAN COMPARISON DATA
Sheet and new brochure, AGREE RELIABILITY IN ACTION.

LOCALIZATION, DETECTION, CLASSIFICATION, KILL. A completely integrated ASW system, the Navy's Sikorsky HSS-2 helicopter and its sonar are designed as one integral unit. Its unexcelled speed permits more rapid closing with the enemy. Sonar locates and helps identify the target, and the latest ASW weapons make the kill. With twin-turbine reliability, the HSS-2 stays up four hours at a clip, searching large areas far beyond the sonar range of any other helicopter made today. Boat-hulled, the HSS-2 has all-weather capability. It's the keen ears and the neutralizing punch of tomorrow's ASW fleet.



SIKORSKY AIRCRAFT Division of UNITED AIRCRAFT CORPORATION Stratford, Connecticut

Research Rundown

Air Force Studies Nuclear Rocket Uses

Air Force has launched a comprehensive study to determine its requirements for nuclear rocket applications, the House Space Committee has been told. Continued success of the joint NASA-AEC Project Rover has increased the Air Force confidence in the potentials of nuclear rocketry, Brig. Gen. Irving L. Branch, Assistant Deputy Chief of Staff (Development for Nuclear Systems), testified.

"We are interested in exploiting the nuclear rocket for military application as an upper stage, as an in-space propulsion device and possibly as a single stage launch system," he said. Branch said Air Research and Development Command has contracted a \$400,000 nuclear rocket study. Though DOD and the Air Force have not detailed any specific requirements yet for nuclear boosters, he said, the defense secretary's office "has also recognized a foreseeable need for large booster capabilities to place military payloads into space."

Liquid Plastic Used In Army Construction

Currently the subject of a feasibility study at the U.S. Army Engineer Research and Development Laboratories, Fort Belvoir, Va., the concept of "building in barrels" envisions the shipment of barrels of liquid plastic to the construction site where the chemicals would be mixed to form a rigid building material of plastic foam.

The concept appears to have great possibilities from a strictly logistical standpoint. Barrels of liquid plastic, at a density of approximately 60 pounds per cubic foot, can be mixed to form a rigid building material of plastic foam at a density of approximately 2 pounds per cubic foot, thereby obtaining 30 cubic feet of material for each cubic foot shipped.

Also, the cost of the material is such that it promises a very economical building—\$1.50 per cubic foot of 1.8 pound per cubic foot density foam, or approximately \$1 per pound in the liquid form.

An experimental building, using the new concept, has been produced by the Laboratories. This building, 16 feet wide, 24 feet long and 9 feet high, weighs 552 pounds, but the amount of plastic from which it was fabricated could be contained in one 55-gallon drum.

APRIL 1961

*Teletype Model 28 ASR—
page printer, tape reader, tape punch . . .
all in one!*



A compact data communications center

The Teletype Model 28 ASR set is a machine of many talents—time and money saving talents that are ready to go to work in your data and message communications systems.

The page printer provides facilities for sending and receiving on message paper or sprocket-fed forms. It can also be used for preparing records or as a read-out device. Platens are available to accommodate a variety of form widths, from 3½" to 9".

The punched tape equipment is unusually flexible and versatile. Facilities are provided for encoding data into tape (with or without printing on the tape) . . . transmitting from tape . . . integrating repetitive data from previously prepared tape with variable data by keyboard . . . obtaining punched tape as a by-product of communications for computer and other business machine input. There is a choice of four different punches and four different readers and, where additional tape punch facilities are needed, a model is also available with an auxiliary tape punch.

In addition, the Model 28 ASR comes equipped with a "big plus"—the Stunt Box, a built-in programming mechanism that offers an inexpensive solution to a wide variety of remote control and switching tasks, such as automatic station selection and telemetering.

All of these facilities are available to you in a compact console measuring approximately 39" high, 36" wide and 23" deep.

Teletype Corporation manufactures this equipment for the Bell System and others who require the utmost reliability from their data communications facilities. Teletype equipment can be used with Data-Phone and other communications services.

For a free brochure on the Model 28 ASR, write to Teletype Corporation, Dept. 77-D, 5555 Touhy Avenue, Skokie, Illinois.

TELETYPE
CORPORATION • SUBSIDIARY OF Western Electric Company INC.



Procurement Trends

DEMC Slated For Approval

Proposals for the establishment of a Defense Electronics Management Center to control the supplies of all electrical and electronics materiel for all military services, are expected to win immediate approval by the Secretary of Defense. The center would be staffed jointly by the military services, report to the Defense Secretary through the Armed Forces Support Council, and operate under the Secretary's direction. As planned, the DEMC would manage some 650,000 items with an inventory value of about \$1-billion. Included would be resistors, capacitors, connectors, electron tubes, crystals, coils, transformers, antennas, wire and cable, headsets and other electrical and electronics parts.

DOD to Tighten Supply Control

Streamlining of Defense supply distribution under single management is acknowledged as the most significant improvement in the Pentagon management system. So far it has produced a reduction from 5 million to 3.7 million in the total number of items in the military supply system. But much remains to be done and Defense has served notice that whatever action is necessary to bring about further improvements will be taken. One vulnerable area: the military services still operate 58 separate inventory control points and 130 supply depots, some of which manage, store and issue the same items in the same geographical location.

Morse Given New Authority

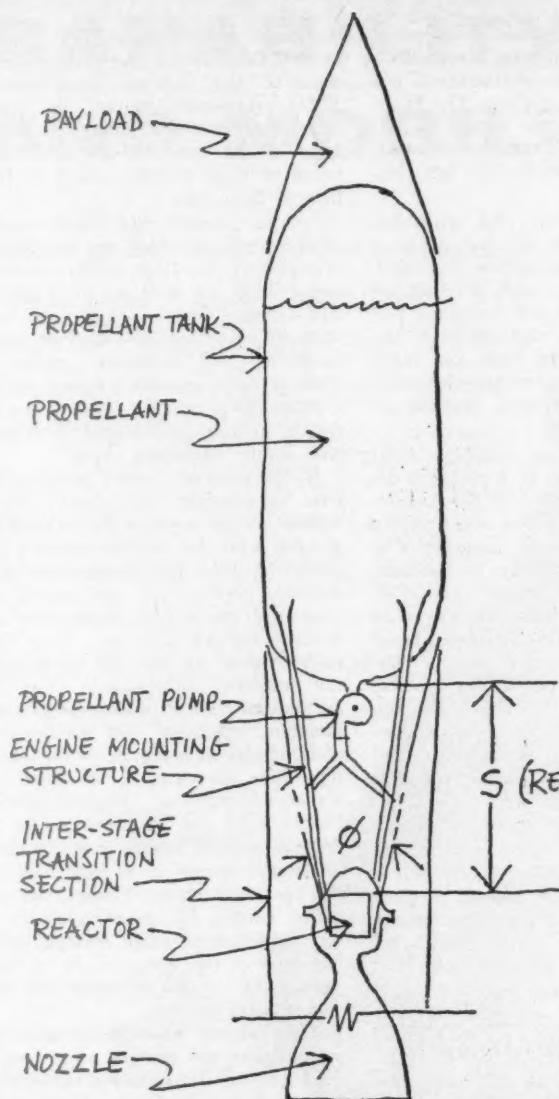
Richard S. Morse, Assistant Secretary of the Army for Research and Development, has received a new jurisdictional blueprint which broadens the scope of his activities and leaves no doubt about who takes charge in the research area. Morse, who used to be Director of Research and Development for the Army before the recent elevation of that office to the level of Assistant Secretary, henceforth will exercise the following: R&D contract authority; functional policy direction for the Chief of Research and Development (Lt. Gen. Arthur G. Trudeau); R&D liaison with the Defense Department, Congress and other agencies; and determinations and findings in R&D contract negotiations with regard to the meeting of criteria set by law. In addition he will supervise R&D budgetary procedures and procurement funds which previously were handled by the Assistant Secretary of the Army for Logistics.

Navy Expands EDP Program

The Navy's Bureau of Supplies and Accounts has placed orders for 11 additional computer systems. At present, the agency operates 21 computers of nine different types in 12 of its activities. With the delivery of the additional computers, all 16 of the Navy's supply activities will be equipped with automatic data processing systems. The Navy's total ADP program is costing about \$21 million annually. This includes rental of computers and supporting electric accounting machines, supplies and the salaries of some 2,300 operating personnel.

AF Fighting Paperwork

The Air Force has declared war again on an old adversary—paperwork. Each year, the Air Force writes about 55 million letters and memoranda, and about 16 million messages, spends about \$50 million on printing and duplicating. Since separating from the Army in 1947, the Air Force has created 8 million cubic feet of records which if stacked would make a pile about 1,500 miles high. Now in use in the Air Force are 65,000 different types of blank forms, although only one-half that number are admittedly necessary. Principal weapon for the fight will be increased automation. One of the principal objectives: elimination of publications issued to cover situations that never occur, or seldom do.



MARTIN NUCLEAR ROCKET PROGRAM

- REACTOR DESIGN
- PROPULSION REACTOR START-UP
- NUCLEAR ROCKET SAFETY ANALYSIS
- RADIATION EFFECTS ON ROCKET SYSTEM
- FUEL ELEMENT DEVELOPMENT
- VEHICLE DESIGN
- CRYOGENICS

RADIATION INCIDENT ON TANK = ϕS
 $\phi = f S$
 TANK WEIGHT = f (PROPELLANT PRESSURE)
 PROPELLANT PRESSURE = f (PROPELLANT TEMPERATURE)
 PROPELLANT TEMPERATURE = f (RADIATION ON TANK)
 TANK WEIGHT = $f S$
 ENGINE SUPPORT STRUCTURE WEIGHT = $f S$
 INTER-STAGE TRANSITION SECTION WEIGHT = $f S$
 INTEGRATION OF THESE FACTORS
 WILL LEAD TO AN OPTIMUM S .

THE PROBLEM OF RADIATION HEATING IN NUCLEAR-POWERED ROCKETS



Martin liquid hydrogen test facility at Denver where heat transfer experiments are carried out.

The first flight of a U.S. nuclear rocket is targeted for the mid 1960's; but the achievement of this objective will depend upon the successful solution of many complex technical problems. At Martin, we are investigating all the areas listed above in a coordinated program designed to help solve these problems. An example of one approach to a problem area is illustrated. It concerns the propellant temperature elevation and excessive evaporation that might result from intense radiation created by the reactor.

Martin engineers at Baltimore and Denver are working on several approaches to the solution of this problem: 1) separation between the reactor and the propellant; 2) continuous cooling of certain components by the cryogenic propellant; and 3) shadow-shielding of propellant and components. Optimum solution appears to involve a combination of these alternatives, and can have a substantial influence on overall rocket system weight and performance.

MARTIN

Programmer To Bridge Defense Plans Gap

New Defense Comptroller, Charles J. Hitch, cites weak spots in Pentagon budgeting-planning system at AFMA conference, prescribes remedies in first formal speech. Text follows:

NO one who has labored very long in the field of Defense management can help but be impressed with the tremendous progress achieved since the end of World War II by people like yourselves. This is particularly true with regard to financial management.

Great strides have been made in simplifying and rationalizing the appropriations structure. Comptroller organizations have been established throughout the Defense Department. Basic patterns have been developed for budget program and activity accounts.

Progress has been made in achieving cost-based budgets. Institutional arrangements designed to promote efficiency and economy, such as consumer funding and the use of stock and industrial funds, have been established. Financial accounting for materiel inventories is now standard in all the Services. Much else has been accomplished.

But the main lines of the financial management structure within which

we now operate were laid down many years ago. Since that time, a revolution has occurred in the character of our forces and weapon systems. The financial management tools, forged in different times and for different tasks, are not fully suited to the job they have to do today.

This is not to say that what has been accomplished in the financial management field should be discarded. Quite the contrary; most of what we have remains useful and necessary. But we have to add to what we have. We have to develop the tools and techniques which are required to deal with the Defense management problem as it exists today.

The revolution in military technology since the end of World War II, or even since the end of the Korean War, has had a profound effect on the character of the military program. The great technical complexity of modern-day weapons, their lengthy period of development, their tremendous combat power and enormous cost have placed an extraordinary premium on the sound choice of major weapon systems. These choices have become, for the top management of the Defense Department, the key decisions around which much of the Defense program revolves.

Yet, it is precisely in this area that our present financial management system shows its greatest weakness. It does not facilitate the relating of costs to weapon systems, tasks, and missions. It does not disclose the full time-phased costs of proposed programs. And, it does not provide the data needed to assess properly the cost and effectiveness of alternative programs. These weaknesses have been a matter of increasing concern to the Congress and particularly the House Appropriations Committee, as is evident from the Committee's report on the 1961 Defense Appropriation Bill.

Admittedly, the financial management system must serve many other purposes. Certainly, it must produce a budget in a form acceptable to the Congress. It must account for funds in the same manner in which they are appropriated. It must provide to managers at all levels in the Defense establishment the financial information they need to do their particular jobs in an efficient and economical manner. It must produce the financial information required by other agencies of the Government—the Bureau of the Budget, the Treasury, and the General Accounting Office.

But all this is not enough. The financial management system must also be made to provide the data needed by top Defense management to make the really crucial decisions, particularly on

the major forces and weapon systems needed to carry out the principal missions of the Defense establishment. These decisions cannot be made rationally without an adequate knowledge of the available alternatives, in terms of their military worth in relation to their cost.

Let us consider first those aspects of the problem which are the special province of the Comptroller—namely, costs. What we need are more precise and comprehensive estimates of total costs of major weapon systems, other programs, and activities, related to each of the principal missions of the Defense Department. These estimates should include both initial investment and annual operating costs.

In the case of a major weapon system, for example, the estimate should include all the costs of the system beginning with the original research and extending through development, production, deployment, and actual operation of the system. In terms of the existing budget structure, these estimates would include all costs under the research, development, test and evaluation title, procurement, construction, operation and maintenance, and military personnel—to the extent that these costs can be identified and associated with a particular system. Furthermore, the time horizon of the estimate should extend over the entire life of the system, or at least well into the operating phase. Finally, the estimates should be made available to top management early enough in the life cycle of the system to be of maximum value in the planning and decision-making process.

The present financial management system does not provide such cost information on a systematic, comprehensive, and regular basis. There are a number of useful studies and reports dealing with parts of this problem—the Report on Major Military Systems and Programs (the so-called MS reports), various WSEC analyses, and other studies made from time to time on particular problems. But nowhere is there to be found a comprehensive reporting system which brings together at one time and at one place, and in a uniform manner, all the cost information required by top management to reach rational decisions on major weapon systems or programs in light of all the cost implications of the other alternatives available.

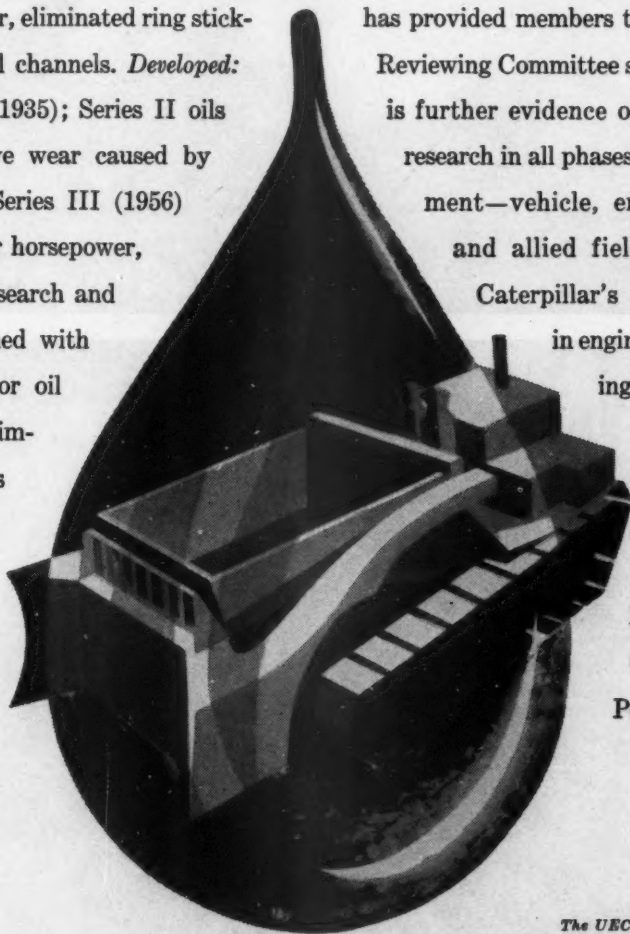
Nor is that all. The present accounting structure is not designed to produce the financial data needed to validate and refine such cost estimates on a mission and weapon system basis. The present structure is designed primarily to account for the use of

(Continued on page 50)

CAPABILITY IN POWER AND MOBILITY *for defense*

Problem: carbon, lacquer and gum deposits on working parts of diesel engines. *Needed:* diesel lubricating oils that minimized deposits, resisted scratching and parts wear, eliminated ring sticking and assured open oil channels. *Developed:* "Superior Lubricants" (1935); Series II oils (1948) to fight excessive wear caused by high sulfur fuels; and Series III (1956) for use in today's higher horsepower, higher speed engine. Research and testing were accomplished with the cooperation of major oil companies. To speed oil improvement, Caterpillar's single-cylinder test engine is now used in 67 laboratories throughout the world. Among other accomplishments,

Caterpillar helped develop the first military oil specifications and has contributed heavily in developing current revisions. In addition, Caterpillar has provided members to Ordnance Engine Oil Reviewing Committee since its beginning. This is further evidence of Caterpillar's intense research in all phases of equipment improvement—vehicle, engine and component and allied fields. Besides research, Caterpillar's experience and talent in engineering and manufacturing are available to meet your requirements. For more details, write for Bulletin No. 40-20265, Defense Products Department, Caterpillar Tractor Co., Peoria, Illinois.



The UECM, currently under development, is representative of the ability of Caterpillar research in all phases of vehicle development.

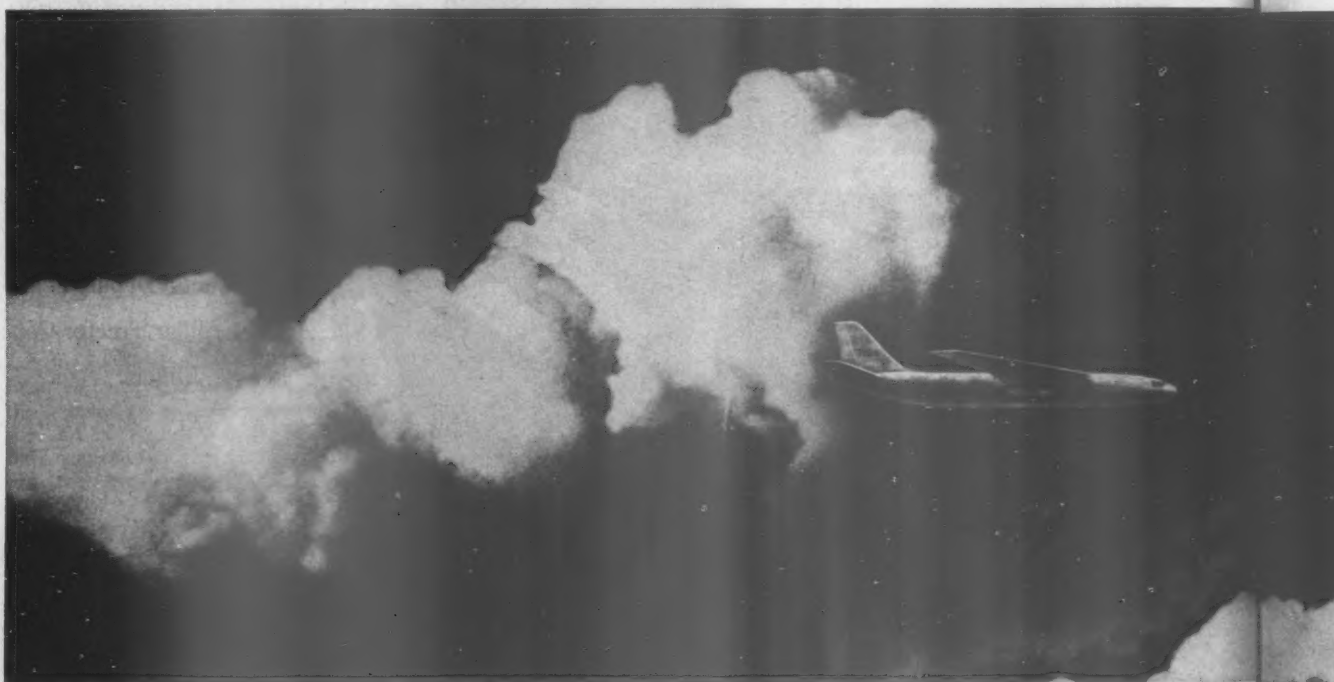
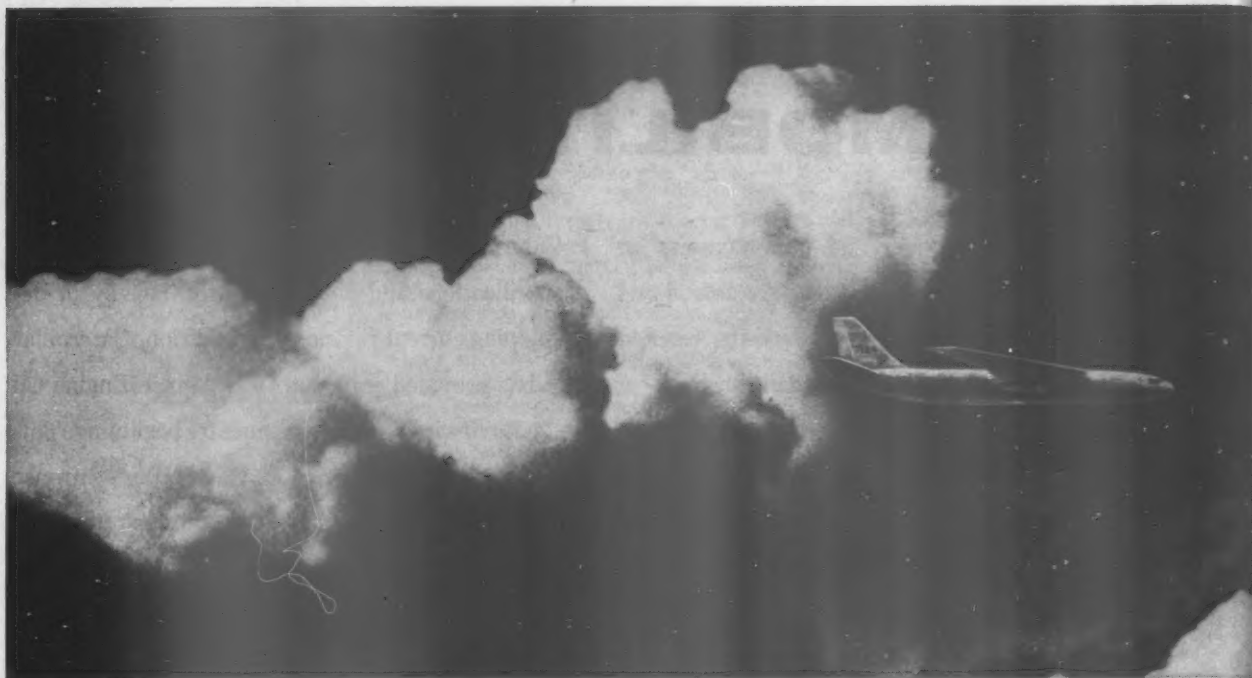
CATERPILLAR

Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

WASHINGTON, D. C.

PEORIA, ILLINOIS

RESEARCH • DEVELOPMENT • MANUFACTURING FOR DEFENSE



Northrop's Laminar Flow Control will enable large aircraft to fly up to twice as far as they now can, and stay aloft proportionately longer, on the same amount of fuel. Or it will permit them to carry heavier payloads over a given distance. And it will accomplish this without increasing the airplane's size, weight, or engine power.

Laminar Flow Control is a revolutionary technique developed by Northrop for reducing friction drag on an

airplane in flight. This drag is caused by the turbulence of the boundary layer of air as it flows over the surfaces of the plane. By drawing off this turbulent air through paper-thin slots in the aircraft skin with a suction system, and exhausting it in the direction of thrust, a smooth "laminar flow" of air is obtained.

The implications of Laminar Flow Control are far-reaching. To commercial operators it can mean substantial cost savings on long distance flights, and make



More sky per gallon

possible non-stop flights over greatly increased distances. To the military, it will be immensely important for surveillance and airborne alert missions, or for any operation requiring aircraft to stay aloft over long periods. On logistic missions, planes can fly in and out of trouble spots without refueling. Dependence on overseas bases will be reduced.

Northrop is conducting a continuing research program for the U.S. Air Force to investigate the applica-

tions of Laminar Flow Control to many kinds and phases of flight. Two airplanes are now being modified under a separate Air Force contract to demonstrate the practicability of this new aerodynamic technique in day-to-day operation.

NORAIR
A DIVISION OF
NORTHROP

Planning Gap

(Continued from page 46)

funds in the same manner in which they were appropriated and to provide cost data for middle and lower echelons of management. These are essential functions and they must continue to be served. I fully recognize that Congress is the final authority on how Defense funds are to be appropriated and accounted for. I also recognize that, as a practical matter, we must budget and account in the same manner in which the Defense Department is organized to do its business. But we also need a financial management system which is directly geared to the top level decision-making process. The several objectives which the accounting system must serve are not mutually exclusive nor are they incompatible. With appropriate modifications, the present system can produce the kind of data we are seeking.

The Measurement

Let us now consider briefly the other aspect of the problem—measuring the military worth of a weapon system or a program. This, of course, is primarily the responsibility of the military planners in the Services and the Joint Chiefs of Staff organization, and not that of the financial managers. What we hope to contribute is an improvement in the data, methods, and techniques needed to relate effectiveness and cost.

The measurement of military effectiveness is doubtless the more complex part of the problem. There are great difficulties involved in reducing the relevant data to quantitative form and in coping with the wide range of assumptions concerning operational employment of various forces and weapon systems. The necessity for making such a large range of assumptions is in itself a reflection of the major uncertainties inherent in much of the available data. The resultant problems are sometimes so intricate that elaborate computations are necessary. Furthermore, in many military problems different fields of technology, as well as unique operational factors, are involved. There is almost never anyone who has an intuitive grasp of all the fields of knowledge that are relevant. Thus, systematic quantitative analysis can prove very helpful, and in some cases may be essential to a solution.

Now, I do not wish to leave the impression that all our problems can be, or need be, solved by quantitative analysis. The essence of choice in military planning is not quantitative analysis; calculation may or may not be necessary or useful, depending upon the problem and what is known about

it. The essential thing is the comparison of all the significant alternatives from the point of view of the objectives which each can accomplish and the costs which each involves, and the selection of the best (or a "good") alternative through the use of what I would call appropriate "economic" criteria.

The Elements *all*

To my mind, the elements of the military problem of "economic" choice are the following:

1. A clear and accurate understanding of the Nation's national security objectives; that is, the aims which we are trying to accomplish with the forces, equipment, projects, or tactics that we are comparing.

2. An analysis of the effectiveness of the alternative forces, equipment, projects, and tactics by which the objectives may be accomplished.

3. The cost of each alternative method of accomplishing the objectives.

4. A model which traces the relations between inputs and outputs—between resources and objectives—for each of the alternatives to be compared so that we can predict the consequences of choosing any one alternative.

5. A criterion or test by which we can choose one alternative rather than another.

Economic choice in military affairs is a way of looking at problems and does not necessarily depend upon the use of analytical aids or computational devices. These aids and devices are often very helpful in analyzing complex military problems. Even where they may not contribute directly to the solution, they may assist in thinking the problem through in terms of objectives and costs. In any case, mathematical models and computations are in no sense substitutes for, or rivals of, good intuitive judgment; they supplement and complement it.

Before we can place ourselves in a position to do the type of analysis I have described, it seems to me that we must bridge the gap which now exists between military planning and budgeting. To that end I have proposed, and Secretary McNamara has approved, the establishment in my office of a new Deputy Assistant Secretary for Programming.

Briefly, his functions will be to:

1. Assemble, consolidate, and present the physical programs of the Services and all other agencies of the Department of Defense. By "program" I mean any budget-generating activity.

2. Translate these physical programs into financial summaries and present them in several ways; i.e., by time period; by initial investment and

annual operating costs; by new obligatory authority, obligations, and expenditures; by mission or task; by weapon system; and by appropriation category. This task is of such complexity that the use of electronic data processing machines will no doubt be required.

3. Provide in the same manner the total financial implications of new or alternative programs.

Obviously, to carry out these tasks, new tools and techniques will have to be devised. These include the development of valid units of measurement for materiel, manpower, and other resources, more refined methods of costing such resources, and a system for integrating these data for use by all functional areas of Department of Defense management. This will be the first order of business of the new office.

To avoid building up a large staff in the new Programming office, I plan to work with knowledgeable people in each of the Military Departments. I also propose to enlist, on a contract basis, the assistance of outside organizations which have the kind of expertise and experience we are seeking to develop for ourselves.

For over-all advice and assistance, I plan to organize an advisory committee which would include the financial Assistant Secretary of each of the Military Departments and perhaps representatives of other appropriate agencies.

The Success

Because the design, installation, and refinement of this new system will require many months, and perhaps even years, I have established within the Programming office a Directorate of Systems Analysis. It will attempt, on an *ad hoc* basis, to utilize whatever data are currently available on the financial implications of alternative programs. In those cases where objectives as well as costs can be quantified, it will collect and analyze information in terms of both costs and objectives.

Again, I want to emphasize that the new office will not engage in military planning but will simply collect and analyze the data produced by the planners.

The success of this new undertaking will depend very heavily on the sympathy, understanding, and active support of all levels of management in the Defense establishment. Organizations such as the Armed Forces Management Association, which are professionally interested in management improvement, can make a most important contribution toward this end. ■

ALLISON

eases driver training

TORQMATICALLY



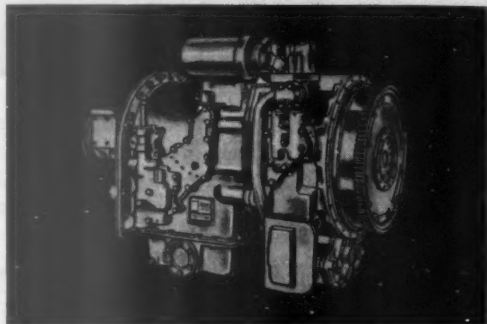
IN 80-TON COAL HAULERS—

Two of these LeTourneau-Westinghouse TORQMATIC-equipped LW-80 coal haulers replaced five 26-ton trucks at a Kentucky coal mine. "Even in wet weather and with 90-ton loads," the company reports, "the TORQMATIC units get underway slow and easy. A transmission like this that can take up the shock and, at the same time, give us the full benefit of 525 horsepower is bound to cut our maintenance costs to a minimum."



IN BIG LOGGING TRUCKS—

This Kenworth Model 849 logging truck is big as all outdoors, yet drives about as easy as a small pickup. Reason? Its Series 5000 TORQMATIC Converter-Transmission team takes the guesswork out of shift-work, eliminates the clutch pedal, is so simple to operate that the newest drivers look like "pros" after a day at the wheel.



IN ANY 450-525 H.P. UNIT—

Newest 5000 Series TORQMATIC DRIVE is the CLBT 5940 designed for Diesels delivering 1,200 ft.-lbs. of torque. It fits large off-highway trucks, scrapers and other high-horsepower, heavy-duty applications, includes a torque converter, hydraulic transmission, lock-up clutch and optional integral TORQMATIC retarder. With 4 forward ranges and 1 reverse, giving 12-phase TORQMATIC operation, it can be direct-engine or remote-mounted with straight-through or transfer case output. Top- or side-mounted power take-offs are also included.—Mail the coupon today for full details.

Allison TORQMATIC
TORQMATIC DRIVES

The world's most complete line of hydraulic drives

Over 980 models used by 108 manufacturers in
100 to 525 H.P. equipment

Allison Division of General Motors
Dept. AF-4 Indianapolis, Indiana

Please send me application data on your
5000 Series TORQMATIC DRIVES

Name

Title

Company

Address

City State





This is Colidar—a dramatically new kind of radar for satellites and other space vehicles.

Unlike conventional radar, which “sees” with microwaves, the Hughes-developed Colidar probes with incredibly narrow, high-intensity beams of light.

The secret is a new kind of light. *Coherent light*. This is a projection of electromagnetic energy at a *precise* frequency—100,000 times higher than conventional radar frequencies.

This high concentration of energy into a narrow beam gives Colidar amazing powers of discrimination—and makes possible ranges far beyond the abilities of present-day radar.

In orbit, a Colidar-equipped satellite could survey vast areas of space—tracking other satellites, space vehicles and other objects. Add this to Colidar’s small size, light weight and low power needs, and the result is the most practical radar for use in space.

Elec
oping
of H
today
which
ducto
pin a
mach

Perha
our 5
suppl
tunity

New space radar probes with slivers of light

Electronics is our business. Developing new kinds of radar is but one facet of Hughes' many activities. Hughes is today building one of the first vehicles which will land on the moon, semiconductors no larger than the head of a pin and computer-controlled industrial machine tools.

Perhaps you have a problem for which our 5,000 engineers and scientists can supply a solution. It may be an opportunity for both of us.

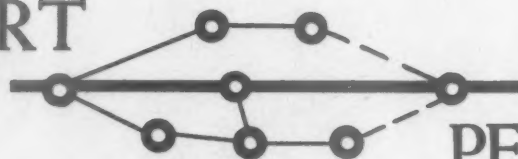
Creating a new world with electronics

HUGHES

HUGHES AIRCRAFT COMPANY

ANNOUNCING . . . FROM OPERATIONS RESEARCH INCORPORATED

PERT



PEP SYSTEM

MANAGEMENT TRAINING COURSE

WASHINGTON, D. C. (EASTERN CENTER) MAY 1-5

SANTA MONICA, CALIFORNIA (WESTERN CENTER) COURSE #2, MAY 15-19

WHAT IS PERT—Program Evaluation and Review Technique—is a revolutionary new tool for management planning and control. PERT was developed originally for the Navy Polaris Program. Since then it has been adopted by the Air Force as the PEP—Program Evaluation Procedure—system. PERT/PEP are now a requirement in a wide and growing number of military development programs. PERT has also been successfully applied to a variety of industrial R & D and production programs.

PERT's singular success is due to demonstrated ability in reducing project time and costs by providing accurate, integrated planning information, and improving the timeliness and quality of decision making. Proposed changes may be quickly "simulated" or tried out to assess their impact on the program through the use of PERT.

THE INSTRUCTIONAL STAFF ORI is the nation's leading designer and consultant in the development and use of PERT management information and control systems. Its staff is highly skilled and experienced in both the technical design and implementation of PERT and its extensions into the cost and reliability areas. ORI staff members have conducted intensive training of both military and industrial personnel in the theory and practice of PERT. With this experience the courses are both informative and interesting.

ORI has pioneered in the application of simulation and gaming techniques to training executive and operational personnel in PERT technology.

FEE . . . \$290 covering class sessions, simulation exercises, use of simulation laboratory and computing facility of ORI.

Fee includes: text, manuals, flow charts, simulation material.

Fee does not include: transportation, living or meal expenses.

It includes five daily sessions 8 a.m.-4 p.m., and one evening session 7-10 p.m.

Inquiries are invited for registration
in the PERT/PEP System Training Courses.

Write to:

Operations Research Incorporated
8605 Cameron Street, Silver Spring, Md.

or

System Training Center
Operations Research Incorporated
225 Santa Monica Boulevard, Santa Monica, Calif.

PERT/PEP Training Courses

PERT/PEP System Concepts

Challenge of the missile age . . . the scheduling of creativity . . . the requirement for advanced technical management information systems . . . the unified management systems concept . . . PERT on Polaris . . . Air Force use of PEP as contractual requirement . . . use of PERT/PEP at diverse management levels . . . benefits to technical staff . . . integrated control.

PERT/PEP Techniques

Basic PERT/PEP approach . . . events . . . activities . . . dependencies . . . networks . . . multiple estimates . . . probability estimates . . . beta distribution . . . PERT/PEP scheduling procedure . . . slack . . . optimistic times . . . pessimistic . . . most likely . . . earliest and latest possible.

PERT/PEP Operations

Data collection . . . standard forms . . . the role of a computer . . . interpretation of output data . . . simulation options . . . management center design . . . top management displays, analysis & briefings.

PERT/PEP Implementation

Adopting the standard system to a specific situation . . . developing system specifications & operating descriptions . . . developing a PERT/PEP staff . . . PERT/PEP computer programs . . . developing initial networks . . . reporting frequencies . . . induration levels . . . assignment of responsibilities . . . extensions to cost and manpower.

PERT/PEP Case Studies

Actual installations of PERT/PEP systems . . . range of industries . . . military and business applications . . . research laboratory example . . . major military prime contractor example . . . commercial manufacturer example . . . major problems and how they were overcome . . . evaluations.

COURSE SCHEDULE TO JULY 1961

WESTERN CENTER	EASTERN CENTER
JUNE 26-30	JUNE 5-9
JULY 24-28	JULY 10-14

In My Opinion

Updating Progress

We wish to congratulate you on the quality, timeliness, and pertinency of the articles, editorials and departments in **ARMED FORCES MANAGEMENT**. As a forum for the expression and exchange of ideas, they are of direct interest to all levels of service management.

Being in the data (information) systems and processing business, we were particularly interested in CWO Chavis' excellent description of operations at Atlanta, page 50 of the February 1961 issue, titled "Transceivers Coordinate Vast Supply Net." Mr. Chavis was one of the outstanding specialists in this dynamic field.

Methodology in data systems and processing changes rapidly and constantly, however, it is understandable that Mr. Chavis is not aware of all of the changes that have occurred since his retirement in January of 1959. Thus some of his points which were achievements then are now passe. Indeed, the Quartermaster Corps might be criticized by knowledgeable readers who assume that they are applicable in the present time frame.

We feel that you and our fellow readers would be interested in learning that as of now:

a. Atlanta General Depot does not act as a "switching center" for transceiver traffic. The depot is serviced by the Army Switched Data Network Switching Center in Atlanta proper.

b. Detail cards rather than "balance cards" are used as billing documents.

c. Balance cards are not "duplicated to form an accounts receivable file." This file is established by creating summary punched IBM cards concurrent with preparation of customer's bill.

d. With respect to receiving requisitions in "punched card form," the Quartermaster Corps achieved this major breakthrough in the latter part of 1959.

e. Reduction of billing time for the great majority of transactions was more modest than indicated—it was from 60 to 45 days. This is a significant improvement considering the number and value of the transactions involved. Only in rare exceptions was billing time from "five to nine months." These rare exceptions will always be with us since they are the result of specific events which have built-in delaying factors.

Colonel Earl I. Seekins

Quartermaster Corps, USA
Chief, IDPS Division

APRIL 1961

You Get Things Done With Boardmaster Visual Control



- ★ Gives Graphic Picture of Your Operations —Spotlighted by Color
- ★ Facts at a glance — Saves Time, Saves Money, Prevents Errors
- ★ Simple to operate — Type or Write on Cards, Snap in Grooves
- ★ Ideal for Production, Traffic, Inventory, Scheduling, Sales, Etc.
- ★ Made of Metal. Compact and Attractive. Over 500,000 in Use

Complete price **\$49⁵⁰** including cards

FREE

24-PAGE BOOKLET NO. AM-20
Without Obligation

Write for Your Copy Today
GRAPHIC SYSTEMS
Yanceyville, North Carolina

Common Stock Investment Plan

For as little as \$10 a month you can purchase shares in **HAMILTON FUNDS**. Hamilton is an investment fund holding common stocks of over 80 corporations, selected for income and growth possibilities.

Hamilton Funds

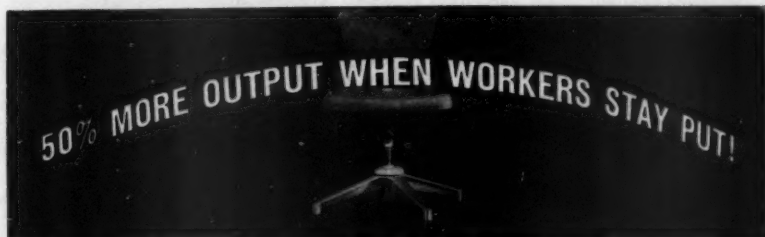
HAMILTON MANAGEMENT CORP.
Dept. H-4 Box 5061, Denver 17, Colo.

Please send prospectus-booklet without obligation.

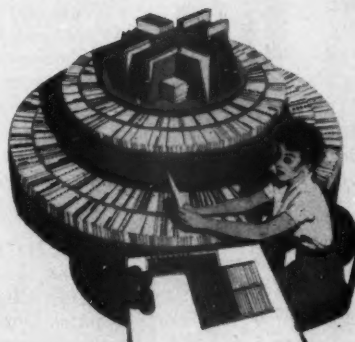
Name

Address

City State



New ACME VISIBLE ROTARY cuts record handling time in half!



A touch of a button spins data to user at electronic speed! Look at any point in your operation where record or data files are used. You're apt to see workers spending a third to half their time shuttling between desks and cabinets, reaching, stooping, drawer pulling. New Acme Rotaries end this waste motion completely! At desks around a smartly modern Rotary, 1, 6, 12 users or more have instant access to as many as 250,000 records. To see how Rotaries save time, money, and up to 50% in floor space, SEND COUPON TODAY.

ACME VISIBLE

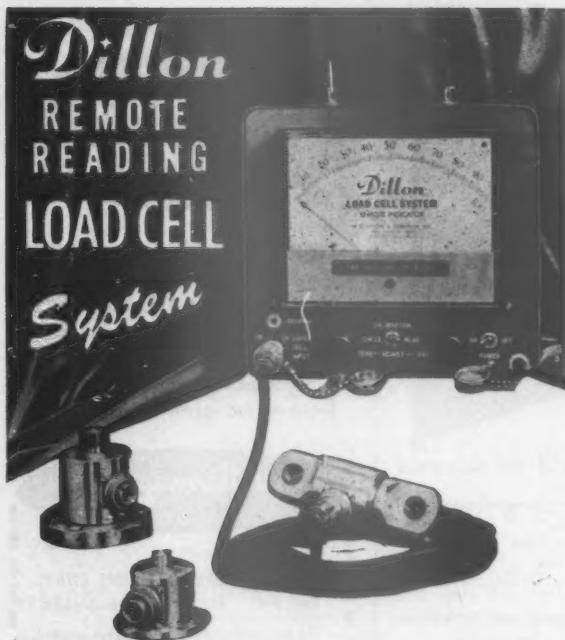
Acme Visible Records, Inc.,
8004 W. Alhambra Dr., Cross, Va.
Please send free report on the "Revolution in Record Handling" ... showing many types and sizes of power and manual Rotaries.

Name Title

Company

Address

City Zone State



READS DIRECTLY IN POUNDS NO CIRCUIT BALANCING. NO CHARTS. CHOICE OF TENSILE COMPRESSION OR PUSH-PULL.

Designed upon differential transformer principle. Has no internal gears, levers or linkage to bind or wear.

Dillon Load Cells are accurate to within $\frac{1}{2}$ of 1% of full capacity at any point on dial. Non-magnetic. Sensitive to load change of 1/10th of 1% of scale capacity. Tare loads up to 30% can be quickly canceled. Linear dial spacing made possible due to fact that output from Load Cell is in exact linear relation to mechanical displacement.

12 volt DC battery operated model or straight AC model optional. As many as four Load Cells may be used with one Indicator which totalizes individual loads. Minute elongation of Load Cell, even when operating at peak, varies between .002" and .004" depending upon capacity.

Load Cells are fully sealed. Most capacities are of beryllium copper. Can't rust or corrode. Explosion-proof versions can be supplied on order. AN type sockets and plugs used throughout with heavy duty cable.

Temperature compensated circuit utilizes semi-conductors entirely. No tubes. No complicated, troublesome amplifiers. Load Cell safety factor is 4-1. Hysteresis is less than 1/10th of 1% of full scale capacity. Recorder jack is standard.

27 DIFFERENT CAPACITIES from as low as 0-150 pounds up to as high as 0-200,000 pounds. Variety of connectors such as swivel hooks, cable sockets, threaded studs, etc., available as accessories.

COSTS YOU NOTHING TO INVESTIGATE. WRITE TODAY FOR PROFUSELY ILLUSTRATED BROCHURE.

LC-2

W.C. Dillon & CO., INC.

WRITE DEPT. 101
14592 KESWICK ST.
Van Nuys 74, Calif.

Newsletter

Armed Forces Management Association
Washington 25, D.C. METropolitan 8-1071

National Conference Highlights

Following the conference schedule outlined in ARMED FORCES MANAGEMENT for January, and addressing themselves to the challenging theme, "Good Management—Key to Survival," distinguished guest speakers from industry, Defense, education and the professions, teamed up to produce what is probably the Association's finest effort to date. From the Call to Order by AFMA President, Lt. General Roscoe C. Wilson, USAF, the afternoon of Tuesday, February 28, through Dr. J. Sterling Livingston's, "The New Management Elite" which concluded the sessions at noon on Thursday, March 2, the program was packed with a diversity of management thoughts, ideas and innovations. Those who were fortunate enough to be present were treated to one of those rare opportunities to participate in an extremely valuable operation; those who couldn't make it, should make every effort to attend the Chicago meeting this fall which will be a new and streamlined version based on the lessons learned in Washington. More on the next conference follows at the end of this newsletter.

Complementing the general sessions of the conference were two enjoyable social events—a Reception held at the Army & Navy Town Club the first evening, in honor of the industry membership, and the perennial Awards Banquet held at Bolling Air Force Base Officers' Open Mess the evening of the second day. Both events were well supported, with approximately 300 members and many distinguished guests at each function.

The Banquet served as a forum for our distinguished guest speaker, the Honorable Charles J. Hitch, Assistant Secretary of Defense, (Comptroller), to deliver a major policy address entitled: "The Defense Budget as a Management Tool." This excellent presentation has received wide publicity in the nation's media, and AFMA is extremely proud that its meeting should be chosen by Secretary Hitch as the locale for his important and far reaching pronouncements.

The Awards Ceremony, as usual, was quite impressive and covered a wide range of recognitions and rewards, all given to deserving individuals and organizations—member and non-member—whose efforts have strengthened AFMA and enhanced our national defense effort through management improvement. A listing of the national awards, in the order of their presentation by AFMA President, General Wilson, follows:

Literary Award: Hon. Charles J. Hitch. **Corporate Member Certificates:** Eastman Kodak Co.; Operations Research, Inc.; Frieden Corp. **Honorary Life Membership Award:** John F. Snyder, Lt. General Edward T. Williams, Colonel Frederick F. Vreeland, USAF. **Achievement Award:** George H. Roderick. **Service Award:** Remington Rand-UNIVAC and Grumman Aircraft Engineering Corp. **Outstanding Chapter Plaque:** Atlanta Chapter #34, Atlanta General Depot. **Merit Award:** Vice Admiral William F. Raborn.

Toastmaster for the evening of fellowship, entertainment, serious thought, and well deserved recognition was the Association's National Executive Vice President, Vice Admiral Harry E. Sears, USN Ret.

ARMED FORCES MANAGEMENT



He designed a new interchange for radio traffic

This AMF engineer, part of an AMF-U.S. Army team, solved the problem of traffic delays and personal danger in manual re-connection of jumpers when interchanging R.F. transmitters and antennas.

His solution is a push-button-operated, coaxial crossbar switching system, using vacuum switches for circuit selection. A typical system consists of 4 transmitter inputs, 7 antenna outputs plus a dummy load, in a 4 x 8 matrix that can be mounted in a 19" rack. It can be controlled locally or remotely over any type of communication network having a bandwidth of at least 200 cycles.

AMF's coaxial crossbar switching system provides 100% flexibility in circuit path selection and accommodates power levels as high as 500,000 watts and frequencies up to 30 megacycles. It allows 100% utilization of all transmitting equipment. Stubs are automatically eliminated.

To insure fail-safe operation, power is required for the vacuum switches *only* during change of condition. Selection rate: 1 per second. Operating transmitters are safety-interlocked to insure a load. There are no hazards from open wires or inadvertent application of power to dead-lined antennas.

Single Command Concept

AMF's imagination and skills are organized in a *single operational unit* offering a wide range of engineering and production capabilities. Its purpose: to accept assignments at any stage from concept through development, production, and service training...and to complete them faster...in

- Ground Support Equipment
- Weapon Systems
- Undersea Warfare
- Radar
- Automatic Handling & Processing
- Range Instrumentation
- Space Environment Equipment
- Nuclear Research & Development

GOVERNMENT PRODUCTS GROUP,
AMF Building, 261 Madison Avenue,
New York 16, N. Y.



AMERICAN MACHINE & FOUNDRY COMPANY

and manufacturing AMF has ingenuity you can

On Top of the Problem

(continued from page 19)

up to the beach to land the Marines with Communist submarine bases behind them on both flanks. In neither case were submarines ever used to oppose us."

A man who jokingly comments that he was first introduced to ASW through "default," he has spent 19 of his 28 years commissioned service at sea—much of the time in some form or another of an ASW billet.

He got his first taste of ASW in 1936 while aboard the USS Lamson—one of the first ships to be outfitted with effective ASW detection equipment. At that time, very little was known about ASW, so as he says, it was easy to be an expert. Lieutenant (junior grade) Lloyd Mustin became the Lamson ASW officer, in addition to such other duties as gunnery officer, commissary officer and torpedo officer.

An unsuspecting visitor to his Pentagon control center would probably get a first impression of him as a soft-spoken, desk-type admiral. This changes however, merely at the mention of anti-submarine warfare or progress. On ASW progress he says: "During World War II our ASW ship-to-enemy-submarine ratio was bet-

ter than 2-to-1. Now, the ratio is approximately 1-to-1. Don't let anybody kid you, this means tough going. We now have new and better sonar (up to 10 times greater in range), weapons (such as ASROC, improved target-seeking anti-submarine torpedoes, and nuclear weapons), and advanced tactics which by themselves have improved unit capabilities by factors of 10 and more since World War II."

However, Admiral Mustin will be the first to admit that Navy is faced with a problem that is likely to be around for some time to come. The problem: "To stay ahead, as nuclear submarines begin to join the Communist fleet." And of this problem, the main part: submarine detection. "To us the biggest problem is detection," he says. "As long as there are subs, there will be the problem of detection. Concealability is the reason for existence of the submarine, and without it there would be no use for submarines. With the addition of nuclear power, the submarine can stay down longer and run farther, and the problem of defeating his concealment is increased tremendously."

The nuclear submarine will indeed pose a problem in the future, (5-to-10 times more difficult than the conventional submarine) and it isn't one that

is being looked at lightly by Mustin and crew. Since commissioning of the nuclear submarine Nautilus six years ago, Navy units have been conducting ASW exercises with nuclear submarines at every opportunity. Admiral Mustin believes the best training ASW forces can get is against top-quality performances by our own submarines and this they get in full measure. "During these exercises," he says, "our subs are just as eager to win as the ASW forces are, and some really hot situations are the normal course of affairs for both sides."

It is no wonder that Admiral Mustin chose the Navy as a career. He was born in July 30, 1911, at the Navy Yard, Philadelphia, Penna. His great-great-grandfather was Commodore Arthur Sinclair, USN (War of 1812). His great-grandfather, Captain Arthur Sinclair, commanded one of Perry's ships in the opening of trade with Japan. Admiral Mustin's father, Captain Henry C. Mustin, USN, was a pioneer Naval aviator.

Admiral Mustin, has managed to keep alive various hobbies and pastimes which include fishing, hunting, skin-diving, golf (rarely), boating, tennis and competitive pistol and rifle shooting.

His hobbies, however, do not get much time these days as he pursues more and better ASW systems. He believes that nothing is easy in getting changes through the Defense red tape, but this isn't necessarily all bad. "The reason so many people complain about the red tape is because of pet projects," he thinks. "They always seem to think their idea is wonderful but that some blind bureaucrat doesn't. A lot of what they call red tape, I feel, is necessary. Someone has to hold the line on what could be outrageous spending. If we didn't have the watchdogs, we would be spending taxpayers' money like pouring sand down a rat-hole. Nothing is easy in a business as big as the Department of Defense, but I feel the system has responded very satisfactorily, at least in the part I see here—which is the Navy—as measured by delivery of the goods."

The deciding factors behind the future success of the man who survived the sinking of the USS Atlanta in WW II will not rest on how well he cuts the military red tape, but will depend on: (1) whether or not he will continue to have the same hard core personnel and professional confidence backing him as in the past, and (2) whether or not he continues to get the support needed in developing new and better weapons and methods to keep up with the ever increasing threat.

STOP COSTLY RE-DRAFTING OF ORGANIZATION CHARTS

THE COFFIELD EVERLASTING EASY TO CHANGE

Interchangeable

ORGANIZATION AND MANNING CHART



FD 10129 Supv. Selen. Staff Asst. OS-1301-13 J. Roger Davies
FD 10175 Asst. Selen. Staff Asst. OS-1301-13 VACANT
FD 10012 General Engineer OS-101-12 VACANT
FD 10050 General Engineer OS-101-13 E. J. Duff
FD 9967 Clerk (typist) OS-101-5 Dorothy Traffalis

A typist, a typewriter and furnished perforated strips are all you need to keep your chart up to date!



- Sizes to Fit Any Organization Structure
- Photographs for Sharp Prints
- Make Fast Spot Changes
- All Parts Are Movable and Re-usable
- In Government Service Everywhere

ENLARGEMENT OF STRIPS SHOWN IN CHART. Each strip. Actual size 4 1/2" x 6". This chart permits listing of all personnel by job classification, rating and name, if desired.

Write for free Illustrated Brochure AF-16 or Consult our GSA Federal Supply Service Contract GS-00S-31608 Group 74-Parts 3 and 2—Item No. 50-63. Code 79.

MANAGEMENT CONTROL CHARTS CO.

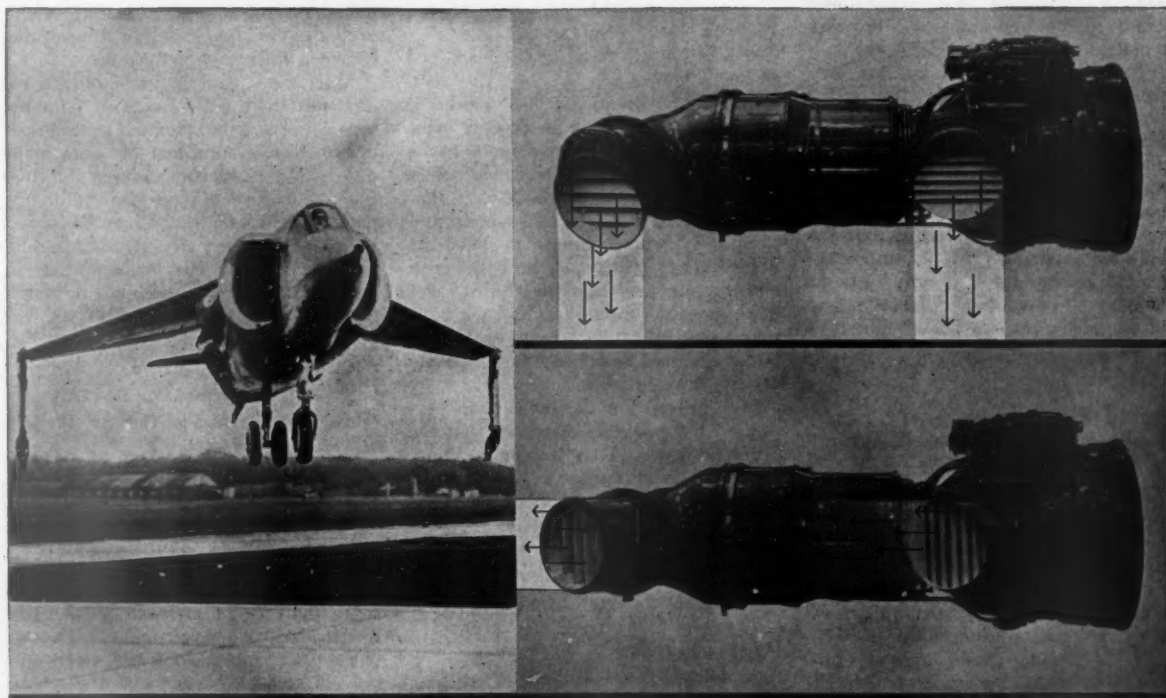
1713 N. WELLS ST.

CHICAGO 14, ILL.



AERO POWER

LIFT and THRUST from ONE ENGINE - the revolutionary BS 53 turbofan



The new Bristol Siddeley BS 53 high-ratio turbofan represents a major engineering breakthrough in the field of aircraft propulsion.

Because the BS 53 can be fitted with movable nozzles evenly disposed around the centre of gravity which give directional control to its total thrust, this remarkably versatile engine provides the airframe designer with a *single power source for all conditions of flight.*

VTOL, STOL and normal take-off capability in the same aircraft. Suitable for subsonic or supersonic applications.

High cold-flow ratio gives high thrust for low weight, low fuel consumption and low noise level.

Conventional installation. Operational simplicity. Independent of all fixed ground installations.

Problems of ground erosion, recirculation and ingestion of debris reduced to a minimum.

The Bristol Siddeley BS 53 has already been selected for, and is now undergoing trials in the Hawker P 1127 VTOL light strike fighter and is supported by the Mutual Weapons Development Programme for NATO.

For further information please write to: Bristol Aero-Industries Limited, 10210 Pie IX Boulevard, Montreal North, PQ, Canada.

BRISTOL SIDDELEY ENGINES LIMITED

TURBOJETS • TURBOFANS • TURBOPROPS • RAMJETS • ROCKET ENGINES • MARINE AND INDUSTRIAL GAS TURBINES
MARINE, RAIL AND INDUSTRIAL DIESEL ENGINES • PISTON ENGINES • PRECISION ENGINEERING PRODUCTS

AFMA Conference Quotes

Lt. Gen. Roscoe C. Wilson
Deputy Chief of Staff, USAF
(Development):

"While we pride ourselves that some progress has been made in the field of improved management, we know that we have hardly begun our campaign. The problems of management are becoming more and more acute. The costs of providing and maintaining modern defense systems are growing dramatically, in part at least because our progress in technology has outstripped our progress in the social sciences. Rising costs compel us to make the most searching efforts to achieve effective defense more economically. Without good management techniques such as the AFMA sponsors, there is little doubt but that we would be facing a crisis in cost management today—for it is only through management that our defense needs and our resources can be brought into harmony."

Harold F. Smiddy
Vice President, Management Consultation Service, General Electric Co.:

"As our mutual interests and common purposes become jointly more evident, let us also realize the growing need to get competitive participation of industry brains and leadership into both Defense and economic planning, not merely into competitive bidding to implement specifications already conceived and detailed without benefit of their knowledge and potential contributions."

"It stands out for all of us to see, as

the so-called cold war increasingly becomes activated through economic rather than through weapons channels, that mankind all over the world—and on both sides of all the curtains—has a mounting common desire to see science and its fruits steered to the betterment of man instead of world destruction."

Elmer B. Staats
Deputy Director, U.S. Bureau of the Budget:

"President Kennedy has made it abundantly clear that he expects overgrown administrative machinery to be cleared away; he believes in clear assignments of responsibility, rather than allowing free rein to anybody and everybody who happens to have an itch to get in on the act; he believes in encouraging new thinking; he believes in responsible budgeting, and we have found that he knows how to examine a budget request and find things that the experts have missed."

"Beyond all this, he believes in purposeful government—in short, that the program objective is the main thing, and that everything we do must be tested by the results. And all this adds up to our mandate to get on with the business of equipping Government to function promptly, smoothly and meaningfully."

Paul H. Riley
Dep. Asst. Secretary of Defense
(Installations and Logistics):

"We must continuously analyze our organization for supply management

and make those changes which are essential to keep organization and program development in balance."

"We need to develop better relationships, on a more definitive basis, between the command line which sets the program level for supply support and the inventory managers who must interpret program guidance and invest Defense dollars in inventories. We still have much untapped potential in the exchange of long supply inventories between inventory managers."

"The more complex weapons of today and their wide range of complex repair parts have created a technical documentation problem of large magnitude. We must considerably improve the availability of technical reference data which will enable us to cross-index items which are interchangeable. Not the least of our problems lies in the standardization field where much joint industry-Defense work yet remains to be done."

Lt. Gen. George W. Mundy
Commandant, Industrial College of the Armed Forces:

"The complexity of modern society, the revolutionary rate of change of every aspect of our national and international relations, and the enormous costs of developments in science, industry, and the military establishment require that the public, and particularly the leaders of public opinion have a clear understanding of the issues involved."

"Our democratic system of government is based on the premise that the power of the state rests on the will

NAZ DAR

COMPANY

ESTABLISHED 1922
INDUSTRY'S MOST MODERN
SCREEN PROCESS INK PLANT

MOST COMPLETE SILK SCREEN INK SUPPLY AND EQUIPMENT SOURCE IN THE WORLD!

INKS • VARNISHES • FILMS • LACQUERS • KNIVES
A COMPLETE SILK SCREEN PLATE-MAKING DEPT.

Our service department will assist you in any screen printing problem.

WRITE TODAY for 64-pg., fully illustrated catalog with "how-to" data, silk screen printing "kits," and hundreds of quality screen process colors, equipment and supply items.

The NAZ-DAR Company
Dept. AF • 481 N. Milwaukee Ave. • Chicago 10, Ill. • CHicago 3-1630



of the people, freely expressed. If the people do not understand the issues of the day, they cannot take intelligent action to safeguard the future of their society.

"The overriding challenge of the day and the years ahead may well be how to provide the citizen, and particularly the adult member of our society, with an opportunity to analyze the issues of the day, to study their implications and to arrive at well considered conclusions."

Rawlings S. Poole

*Management Evaluation Officer
Asst. Sec. Defense (Comptroller):*

"In large governmental machinery, the raw data on which decisions must be based are almost never seen in their original form by the decision maker. To an indeterminate extent, the range of possible choices has been reduced and even the final choice has been partially shaped. Once a decision is made and the action on it is started, the problem has changed. The situation to which the decision was addressed originally cannot be recreated. Each decision closes some of the alternatives that were available at the time it was made. Action on each decision opens up some new alternatives that were not detected or perhaps not available before."

Rear Adm. Thomas A. Long

*Deputy Chief, Navy Bureau
of Supplies and Accounts:*

"The need for management improvement is manifest. With the incentive of meeting competition in world commerce, management of private U.S. enterprise has a major task ahead. It must seek to recoup its competitive position by cost reductions in overhead areas, the office and administrative areas if you will, through productivity increases.

"In the military establishment the need may even be more urgent. The theme of this conference 'Good Management—Key to Survival' could not be a better or more timely slogan. Uncle Sam's resources are not infinite. We can well be up against the stops with our 40 billion military budget.

"Something has got to give as the weapon, the end item, must get first call for our available funds. The subject of our needed attentions therefore could not be more obvious. It includes the supporting logistic base of our weapons systems, the field establishments, the numerous headquarters agencies—if you will, the whole fabric of the Department of Defense."

James P. Goode

*Office, Secretary of Air Force
Manpower, Personnel, Organization:*

"Despite the obvious manpower costs associated with new weapons, dispersal and alert, the inescapable fact remains that we must manage from year to year within the dollar ceilings limitations that are placed upon us. We must buy all kinds of things such as aircraft and missile systems, utilities and contract services, as well as meet payroll costs for manpower within the budget limitations.

"Decisions in these areas become increasingly difficult and complex because of increasingly expensive hardware and the need to maintain a bal-

ance between manpower and weapon systems. Obviously, procuring more weapons than we can afford to man effectively would be poor management. Conversely, to have an adequate inventory of weapons without adequate manning is just as serious."

D. G. Malcolm

*Vice President, Western Division
Operations Research, Inc.:*

"There is both need and room for separate approaches in the military and in industry moving toward eventual compatibility. Compatibility will not be attained unless both parties work on the problem from their point of view and also interact periodically


NORTHERN ORDNANCE INCORPORATED

Subsidiary of
NORTHERN PUMP COMPANY
Minneapolis 21, Minnesota




Guided Missile
Launching Systems

Prime Supplier to
BUREAU OF NAVAL WEAPONS, DEPARTMENT OF THE NAVY



FREE! 12-page MUROGRAPH



HOW-TO-CONTROL MANUAL Shows:

- ✓ New, error-free controls for Sales, Production, Maintenance, Computers, etc.
- ✓ Fastest card-filing and card-shifting visual control board.
- ✓ Simple, do-it-yourself charting devices: Mekanodex, Strip Signals.
- ✓ Control Cards, a new 'pressure-sensitive' concept.

Name _____ Title _____

Firm _____

Address _____

The VISUAL CONTROLS COMPANY

P.O. Box 93, Norwalk, Conn. Victor 7-8165
GSA Contract GS 005 31885, Group 74, Parts 3 and 2

ANOTHER WASSELL PRODUCT



32 PAGES OF ANSWERS TO HIGH CLERICAL COSTS

Here is the story of the new Wassell Work Organizer principle of filing — full of ideas and examples of how major firms are using Wassell filing systems to save time and dollars.

W
WASSELL ORGANIZATION, INC.
C-4 WESTPORT, CONNECTICUT



LOOK AT ALL THREE

You'll find these exclusive advantages in Wassell Visible Sig-Na-Lok:

- Superior accuracy because signals lock in place — won't cause mistakes.
- Quicker alphabetical changes — because pockets snap out, snap in.
- Longer pocket life because pockets are bound full width — never tear.

Wassell Visible Sig-Na-Lok streamlines your records on inventories, maintenance schedules, personnel.

W
WASSELL ORGANIZATION, INC.
A-4 WESTPORT, CONNECTICUT



HOW TO KNOW IT ALL

Versatile Produc-Trol can give immediate and complete information on almost every phase of production.

No recourse to files is needed; with Produc-Trol all the factors of efficient production are scheduled before your eyes

W
WASSELL ORGANIZATION, INC.
B-4 WESTPORT, CONNECTICUT

by plan to exchange approaches.

"Approached in this spirit, it would appear that many of the following benefits could result to the Government-industry team from a systematic application of the PERT system design approach: (1) Standardization and reduction in reporting; (2) Improved communications by a better common understanding of the data used; (3) Development of a common language in the time, cost and performance areas; (4) Ability to predict program outlook as needed at different levels in the information channel; (5) Ability to evaluate trade-offs, and (6) Rapid identification of weak spots."

Brig. Gen. Robert N. Tyson

Director, Management Analysis,
Comptroller of the Army:

"Progress in managing large organizations—whether as a governmental enterprise or a profit making one—is being made at a rapid rate. The intuitive manager who listens to the spin of his factory wheels as an indication of control is being replaced by the professional manager and the complicated, highly sophisticated management tools such as automation.

"There are four problems that seem paramount: (1) How to set achievable objectives; (2) How to gain organization-wide unity of effort in the interest of the whole; (3) How to facilitate sound decision making, and (4) How to measure simply and effectively.

"We consider these problems as representing challenges to our managerial efforts in the foreseeable future."

Col. William H. Bowers

Director, Educational Requirements
Board, USAF Air University:

"If we can be sure of anything it's change and that our future Air Force officers will be the managers of this change. As such, they are not going to be pure technicians, engineers, or scientists. While they must be technically competent, an entirely new dimension of management skill is emerging as a major educational requirement.

"The management aspects inherent in a commissioned officer must be initially present and continue throughout the career of the individual. The fundamental knowledge of management principles to be gained through education should be included in the undergraduate programs of personnel brought into the system and be enriched through both resident military education and graduate college studies as officers grow in stature, maturity and level of responsibility."

Advertisers' Index

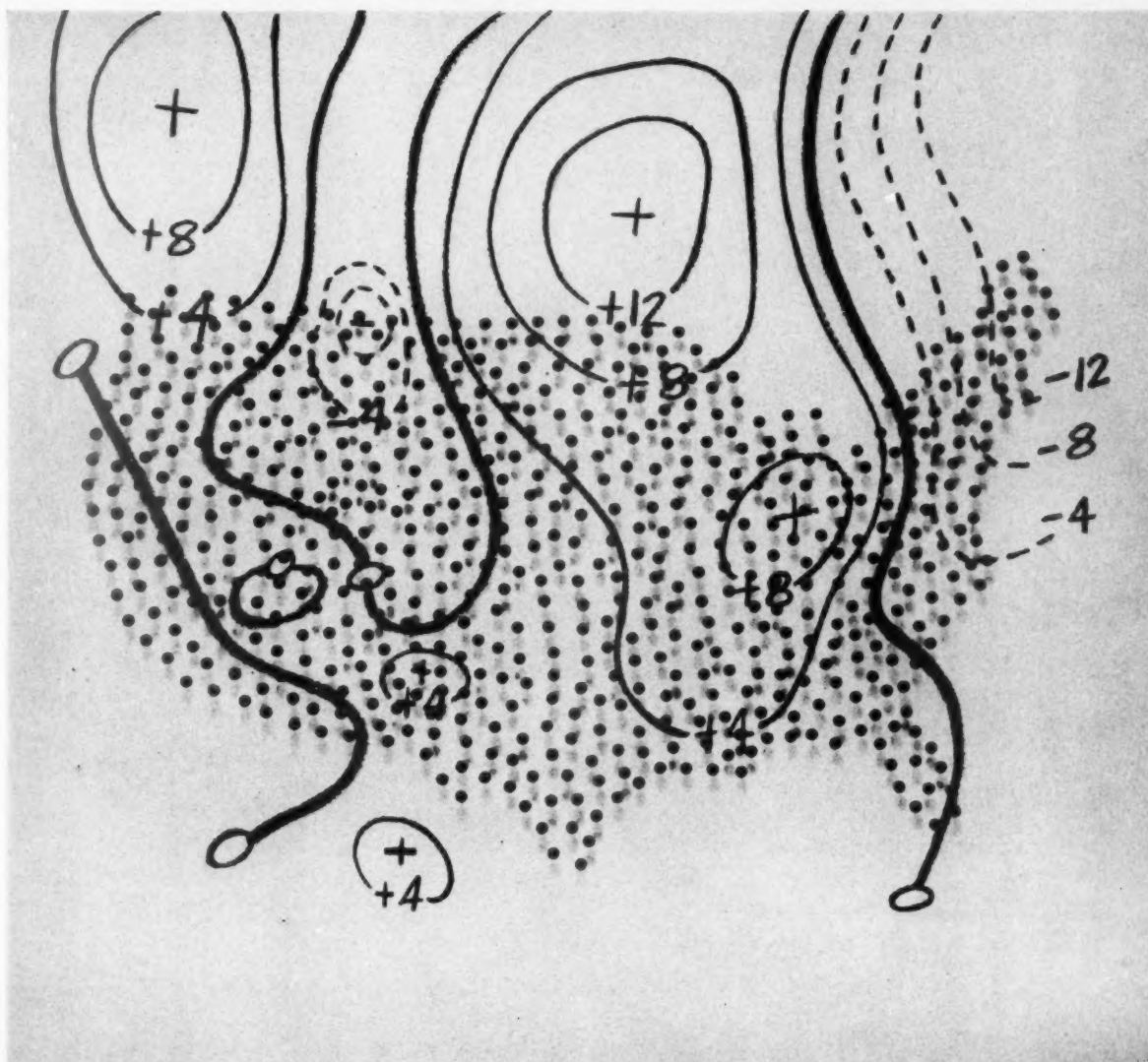
Acme Visible Records, Inc.	55
Allison Div., General Motors Corp.	51
American Bosch Arma Corp., Arma Div.	32
American Machine & Foundry Co., Government Products Group	57
Avco Corp., Research & Advanced Development Div.	29
Bristol Siddeley Engines, Ltd.	59
Caterpillar Tractor Co., Defense Products Div.	47
Defense Systems Div., General Motors Corp.	31
W. C. Dillon & Co. Inc.	56
General Dynamics/Electronics, Military Products Div.	25
General Electric Co., Defense Electronics Div.	8, 9
Government Products Group, American Machine & Foundry Co.	57
Graphic Systems	55
Grumman Aircraft Engineering Corp.	12
Hamilton Management Corp., The	55
Hoffman Electronics Corp., Military Products Div.	40, 41
Hughes Aircraft Corp. 2, 52, 53	
Management Control Charts Co.	58
Martin Co., The	45
McDonnell Aircraft Corp.	64
Monsanto Chemical Co. 36, 37, 38	
Naz-Dar Co., The	60
Northern Ordnance, Inc.	61
Northrop Corp., Norair Div. 48, 49	
Operations Research Inc.	54
Pan American World Airways Philco Corp., Government & Industrial Group	6
Radio Corp. of America, Industrial Electronic Products	10
Sikorsky Aircraft Div., United Aircraft Corp.	42
Teletype Corp.	43
Visual Controls Co.	61
Vitro Laboratories Div., Vitro Corp. of America	22
Wassell Organization, Inc.	62
Western Union Telegraph Co.	63
Westinghouse Electric Corp.	3, 4

CLASSIFIED

AN FITTINGS & HARDWARE

Stainless, Aluminum, Brass, Steel
All sizes—immediate delivery from world's largest shelf stock. Buy direct from manufacturer. Lower prices—quicker service. Send for free wall charts showing complete line of AN and MS fittings and hardware. We also machine parts to your own special print.
COLLINS ENGINEERING CORPORATION
9050 Washington Blvd., Culver City, California

ARMED FORCES MANAGEMENT



Every 15 minutes, weatherfax maps are transmitted simultaneously to weather stations across the United States.

Western Union Facsimile Network sends weather maps 600 places...simultaneously

From the Weather Bureau in Washington, D. C., weather maps speed out in picture data form to 600 stations in 330 cities. This system serves the Weather Bureau, the Air Force, Army, Navy, Coast Guard, commercial airlines, public utilities and other nonmilitary subscribers.

The world's largest facsimile network—designed and engineered by Western Union for the Weather

Bureau—makes this mammoth task routine. Today, weather news goes coast to coast in minutes . . . *in writing* . . . no mistake about it!

Maps are received simultaneously at all network points. Result? All users know instantly of weather conditions in any part of the country *at precisely the same time*.

Eight times each day, from the U. S. Weather Bureau in Kansas City, Mo., special radar maps are

transmitted to these same subscribers.

Now, for any kind of weather, the nation is better able to predict in time, prepare with certainty . . . from data transmitted in exact, error-proof, written form.

WESTERN UNION

*... finds better ways
to speed it electronically.*

Deterrent Strength for the Free World

THE ARMS OF

A PHANTOM

The arms of a Phantom are unique—they are varied, they are sure, they are powerful. The Phantom II delivers a variety of air-to-air and air-to-ground weapons at double-sonic speeds over long distances. It returns to approach at transport-slow speeds and parabreaks swiftly to a stop on existing mile-long runways. Single point refueling and external weapon storage facilitate fast turn-around. Air-to-air refueling adds extended range for intercontinental missions.

Semi-submerged in the fuselage and slung beneath the wings is a multiple load of Sparrow and Sidewinder air-to-air missiles. External fuel tanks and/or a host of conventional and nuclear air-to-air and air-to-surface weapons can be carried to add to its versatility. The combination of speed, range, weapon-carrying capability and a dual purpose all-weather radar system qualifies the Phantom II for its double role as interceptor or attack aircraft. These qualities indicate future capabilities in other major roles as a long range reconnaissance craft or nuclear air defense fighter. The Phantom II is its own new-pilot trainer complete with back seat flight controls.



MCDONNELL

Phantom II and F-101 Fighter and Attack Aircraft •
Project Mercury Space Capsules • Talos Airframes and Propulsion Systems •
Quail Decoy Missiles • Rotorcraft • Electronics Systems • Automation

MCDONNELL AIRCRAFT

ST. LOUIS

